# ORTHOPEDIC

## Handwritten Note

# MBBS Help

http://mbbshelp.com

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Name: _____

Subject: **Orthopedic**

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# HISTORY

1) GALEN — Father of Sports Medicine

2) NICHOLAS ANDREY
- coined the term Orthopaedics
- wrote 1st book —
- Father of orthopaedics.
- Crooked Tree symbol of Ortho

3) JEAN ANDRE VENEL
- Father of Orthopaedics

4) HIGH OWEN THOMAS
- Father of British orthopaedics.
- Thomas splint < was made for TB knee / was used for # SOF
- Thomas collar – soft cervical collar
- Thomas wrench – # reduction
- Thomas Test – Flexion deformity @ Hip

5) PERVICAL POT
- Pott's # → Bimalleolar # (MM + Ly)
- Pott's Spine → TB of spine

6) JAMES PAGET
- Paget's Disease of Bone
- " " " nipple

FRACTURE DISEASE

7) ROBERT JONES
- Father of modern orthopaedics
- Jones # – Robert Jones Bandage

ALBIN LAMBOTTE
Father of modern internal fixation
Coined the term 'osteosynthesis'
described the usage of Biodegradable implant

LORENTZ BOHLER
Father of Traumatology
Bohler Braun splint
Bohler's Angle → # calcaneum
Bohler's Stirrup → skeletal traction

GERHARDT KUNTSCHNER
Kuntschner nail

MARTIN KIRSCHNER
Kirschner wire

MAURICE E. MILLER
Cofounded AO - Arbeitsgemeinschaft
Fur Osteosynthesefragen

ARRAHAM COLLES
Colles #

JOSEPH LISTER
Father of Antiseptic Surgery

AMBROISE PARE
Father of amputation surgery

WTG MORTEN
Father of modern anaesthesia

W.C. ROENTGEN - discovered X-Ray ↓ World Radiology day
Father of Radiology on 8th NOV; 1895

ENNEKING
Father of orthopaedic oncology

John Charnley
Father of arthroplasty — 1st Joint → HIP

INSALL
NORMAN W. SCOTT — I.S.K. → Total Knee Replacement
KELLY

MASAKI WATANBE
Father of Modern Arthroscopy

JOHN BARTON
Barton's #
Barton's Disease → {Vit C = scurvy; Vit D = Rickets}

KENJI TAKAGI
Father of arthroscopy

CAFFEY
Caffey's Syndrome - Battered ~~Bad~~ Baby Syndrome
Caffey's Disease - Infantile Cortical Hyperostosis
↳ M/C Bone - Mandible

GAVRILL ABRAMOVICH ILIZAROV
Distraction Histiogenesis

DR. B.B. JOSHI
JESS Joshi's Ext stabilising system

DR. S.M. TULI
Musculoskeletal TB

DR. P.K. SETHI
Jaipur Foot

# DAYS

Bone & Joint Day - 4th Aug
World spine Day - 16th Oct
World Arthritis Day - 12th oct
World Radiology Day - 8th NOV
World Clubfoot Day - 3rd June

# SPINE

## ANATOMY

DENNIS 3 COLUMN CONCEPT OF SPINAL STABILITY

| ANT | MIDDLE | POST |
|---|---|---|
| 1) Ant. longitudinal Ligament (ALL) | 1) Post 1/3rd of V. Body | 1) Post Longital Lig. complex |
| 2) Ant 2/3 of V. Body | 2) Post 1/3rd of I.V. Disc | 2) NEURAL ARCH<br>Pedicle<br>Transverse process<br>Sup. articular process<br>Inf. articular process<br>Laminal<br>Spinous process |
| 3) Ant 2/3 of I.V. Disc | 3) Post. longitudinal ligament (PLL) | |

## LIST-① - TERMS IN SPINE

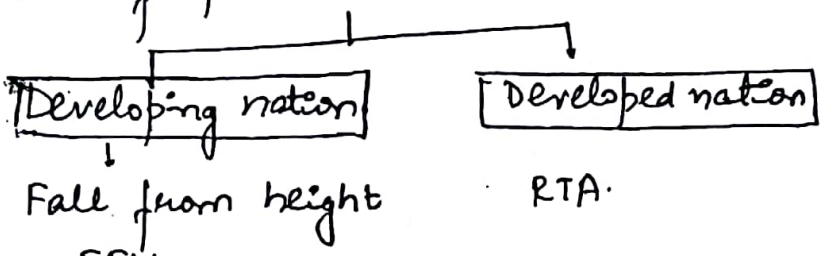
Spondylitis → Paraspinal M/c spasm

Spondylolysis → # of pedicle / Pars Interarticularis

Spondylolisthesis → ~~slip~~ slippage of 1 V. Body over another V. Body.

## LIST-② M/C In SPINE

→ M/c Mode of spinal Trauma




→ M/c mechanism of spinal Trauma
Flexion distraction > Flexion

→ Worst mechanism of spinal Trauma
Translation > Flexion rotation

→ Spinal canal widest at $C_2$ level

→ VERTEBRAE – always constant in no. → Cervical
most variable in no → coccygeal

M/C site of
Spinal Trauma → Cervical spine
Spinal # – Lower thoracic spine
Spinal cord injury – Cervical spine
Peripheral N/V injury – Radial n/v (PNI)
PNI ō BEST Prog – Radial n/v
PNI ō WORST " – ULNAR N/V

PNT ī Worst Prognosis. = SCIATIC N/V
(despite surgical Repair

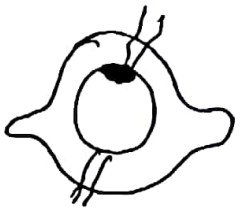
M/c site of Skull Bone # - TEMPORAL

M/c site of Facial Bone # - Nasal > zygomatic

M/c site of Mandible # - Neck of condyle

LIST- 4 #s/ Injuries of Spine ī Eponyms

JEFFERSON's #



Burst # of $C_1$ Ring (atlas)
Involves ® Ant- & Post Arch
85% pts - No neurological deficit
Undisplaced # → collar
displaced # → HALO VEST

HANGMAN's #

Mech:- Hyperextension followed by distraction
Spondylolysis (# of pars interarticularis/pedicle)
of $C_2$ (axis) ī Spondylolisthesis of $C_2$ over $C_3$. ī
$C_2-C_3$ I.V. Disc disruption.

CLAY SHOVELLER's #

avulsion # of tip of Spinous process of $C_7$ > $T_1$
seen in the Labourers who do heavy wt
lifting ī arms extended

CHANCE #/ SEAT BELT INJURY/ JACK KNIFE INJURY

Head on collision of during ~~seat belt~~ RTA

Mech:- Flexion → Distraction → Rotation.

Horizontal # Line Traversing the vertebral Body through all three columns.

Level - $T_{12}$ - $L_2$

50% pts → concomitant intraabdominal injury

UNDERTAKER #.

Post Mortem fending

due to careless handling of dead Body by undertakers Q.

# subluxation of lower cervical spine :
$C_6$-$C_7$ I.V. disc disruption. / tear.

SCIWORA ★ (PGI)

spinal cord injury without Radiological Ab (N)

children < 8 yrs

Initial X-Rays - (N)

Presentation - Neurodeficit
No spinal reflexes

IOC: MRI

Upper cervical Spine

# NEUROGENIC SHOCK / SPINAL SHOCK

young ♂

RTA.

Unconscious

Hypotension.

Bradycardia → Hallmark

M/c site of spinal cord Injury – Lower C. spine

| COMPLETE | | INCOMPLETE |
|---|---|---|
| ⊖ | Sacral sparing | ⊕ |
| ⊖ | Perianal sensations | ⊕ |
| ⊖ | Flexor Hallucis Longus | ⊕ |
| ⊖ | Rectal motor tone | ⊕ |
| ⊖ | Bulbocavernous Reflex / Anal wink | ⊕ |

(last reflex to disappear
1st reflex to reappear
in pt. of spinal shock)

IOC – MRI.

# PAEDIATRIC SPINE

## (I) KLIPPEL FIEL SYNDROME (AIIMS)

Dystrophia Brevicollis Congenita
Bony pathology / segmentation failure
Congenital fusion of cervical vertebrae
child
TRIAD OF KFs → short webbed neck
→ Low post hairline
↓ ~~Restriction~~ Range of movement @ neck
Short statured child
M/C association → sprengel's deformity
Other associations-
Congenital heart defects
ocular anomalies
GUT Abn
Mx- to prevent complications
Cervicothoracic scoliosis
Avoid collision sports.

## CONGENITAL MUSCULAR TORTICOLLIS (CMT)/WRY NECK

Muscular pathology
overcontract of sternocleidomastoid (SCM)
fibromatosis of SCM.
PALPABLE NECK MASS → @ birth
→ in 4-6 wks after birth.

Associations- Developmental dysplasia of Hip.
Metatarsus Adductus

Contracted SCM @ junc' of U 2/3 - L 1/3
Ⓡ side > Ⓛ side.

90-95% pts → Regular stretching exercise.

5-10% pts → Surgical release of muscle only after swelling/mass persists >1 year of age

Forceps Injury → Injure SCM

Complications → ,, I/L Head tilt
C/L Chin left deformity
(Cock Robin ~~def~~ appearance)

2) PLAGIOCEPHALY
(asymmetrical development of skull & face).

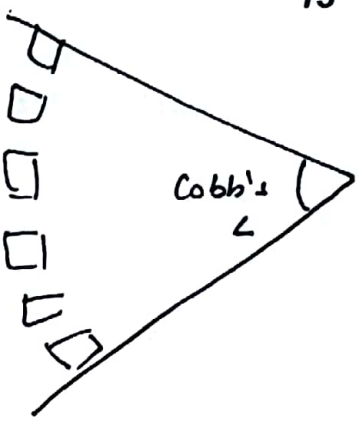
Ⓘⓘ IDIOPATHIC ADOLESCENT SCOLIOSIS

♀ > ♂
around puberty
Double curve
↓
Thoracolumbar

Single curve
↓
Thoracic spine (R/C) R > L
Lumbar spine

Double curve progress earlier than single curve

## COBB'S ANGLE




$< 30°$ → unlikely to progress

$30° - 50°$ → 10-15° progression

$> 50°$ → progress @ 1°/year

3% → scoliotic ~~fit~~ tilt

↳ less than 10% of population. - requires Rx.

→ SPONDYLOLISTHESIS

slippage on 1 v. body over another V. Body

M/C Level :- $L_5 S_1 > L_4 L_5$

M/C N/v root irritated - $L_5$

### TYPES OF SPONDYLOLISTHESIS

A) ISTHMIC/LYTIC

M/c type

Defect in Pars Interarticularis

Congenitally weak pars Interarticularis

↳ sports activity → FATIGUE # of pars

B) DYSPLASTIC

Rare, congenital type

No defect / No # in pars

Defect in formation of 1st sacral arch & superior facets of $S_1$

Neurodeficit is more in this type compared to isthmic type

As there is growth spurt (14 year ♀, 16 year ♂)

LISTHETIC CRISIS

Acute onset of sudden pain & Rigidity in paraspinal M/s c functional / spastic scoliosis.

C> DEGENERATIVE

2nd M/c type > Isthmic

M/c Level $L_4 L_5$

♀ > 50 yrs

Senility → disc generation → Facet Injury
Osteoarthrosis /
2° osteoarthritis

slippage ← Facet Joint ↓
(usually low grade) Unstable

D) TRAUMATIC

# in an area other than pars → slip.

E) PATHOLOGICAL

Generalised / Localised Bone pathology → # of pars interarticularis

⇒ Clinical Spectrum

Asymptomatic initially

Incidental Δ

1st symptom → Backache → degenerative type
Low back discomfort

→ Dysplastic type
Acute, sudden pain.

Radiculopathy

spasm on passive stretching of legs

⇒ Δ :-

X-Ray :- oblique view of L.S. spine

↓

defect in pars Interarticularis

↓

Break in neck of SCOTTY TERRIER DOG SHADOW

↓

Beheaded scotty Terrier sign/

Scotty Dog wearing a collar sign.

(scotty dog terrier shadow is a (N) finding in oblique X-Rays of L.S. Spine)

AP view - Inverted Napolean HAT sign

(Least useful) (due to superimposition of sacrum & L5)

Flexion & Extension views - to see spinal stability

Mx of spondylolisthesis :-

Based on Meyerding's classification/staging

(AP diameter of Sup. surface of lower vertebral body is divided into quarters)

| | | |
|---|---|---|
| I | <25% | → Conservative |
| II | 25-50% | |
| III | 50-75% | → Surgical when there is |
| IV | >75% | |

a) progrencre neurological deficit

b) canal stenosis

c) Refractory pain

## LIST -5 MYOTOMES

$C_5$ - Deltoid

$C_6$ Wrist Extensors

$C_7$ Wrist Flexors / elbow flexors.

$C_8$ Finger Flexors

$T_1$ Finger Abductors

$L_1 L_2$ Hip Flexors (Iliopsoas)

$L_3$ Knee Extensors (Quadriceps)

$L_4$ Ankle Dorsiflexors (tibialis ant)

$L_5$ Extensor Hallucis longus

$S_1$ Ankle Plantar flexors (Gastro soleus)

## LIST- 6 REFLEXES

$C_5$ Biceps

$C_6$ Supinator (Brachioradialis)

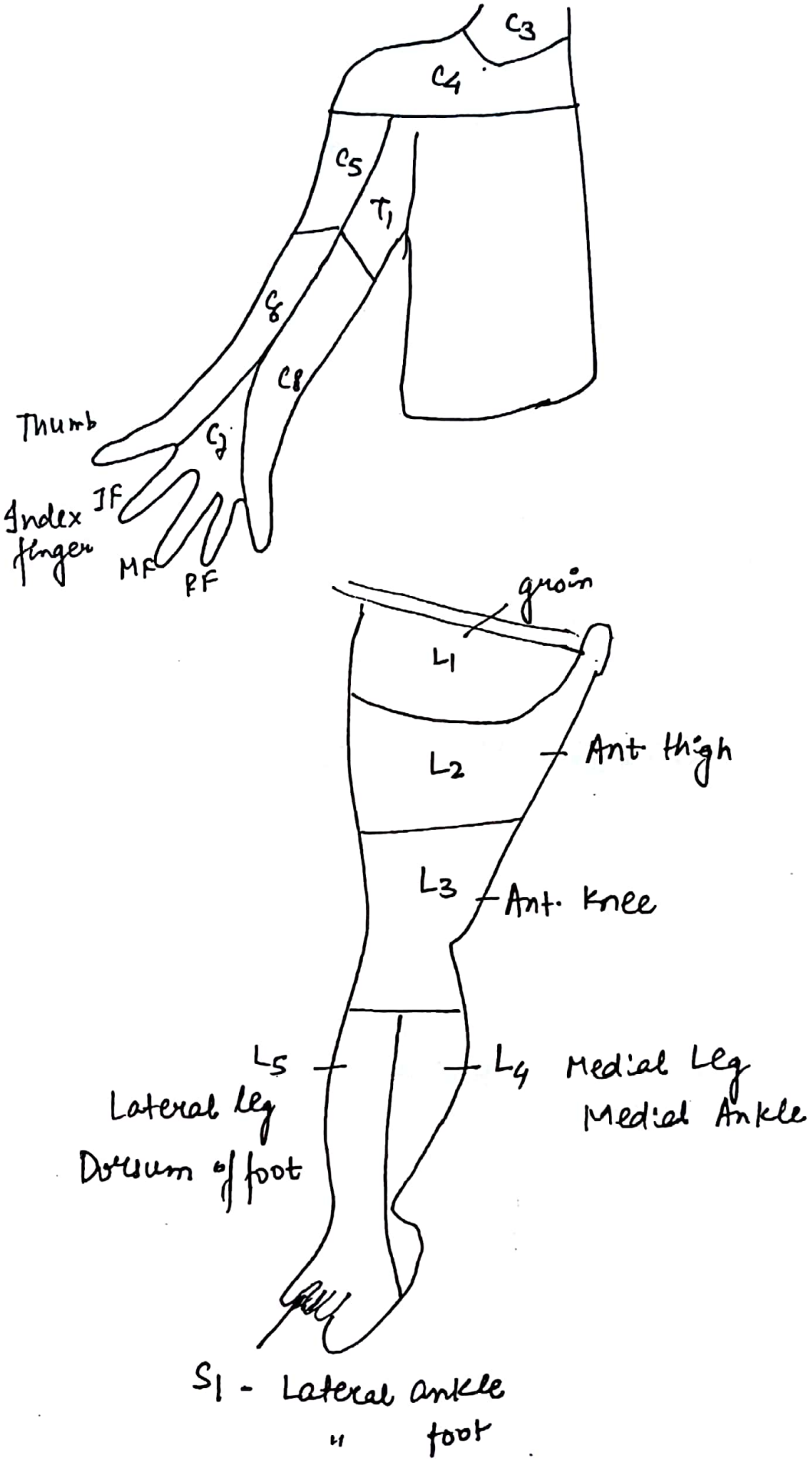
$C_7$ Triceps

$L_3 L_4$ Knee Reflex (Quadriceps)

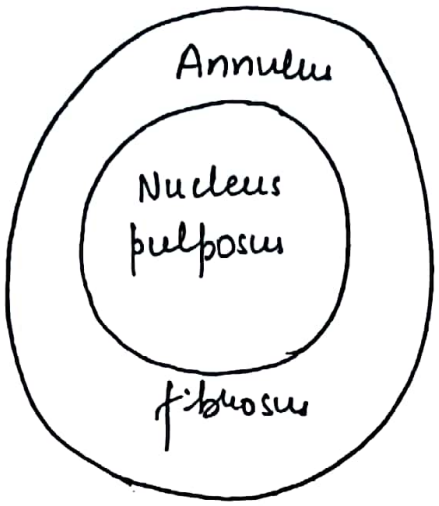
$L_5 S_1$ Plantar Reflex (Femoris)

$S_1 S_2$ Ankle Reflex (Gastro soleus)

LIST 7 **DERMATOMES**



# PROLAPSE INTERVERTEBRAL DISC




M/c Level- $L_4L_5 > L_5S_1 > C_5C_6 > C_6C_7$

MRI BASED STAGING

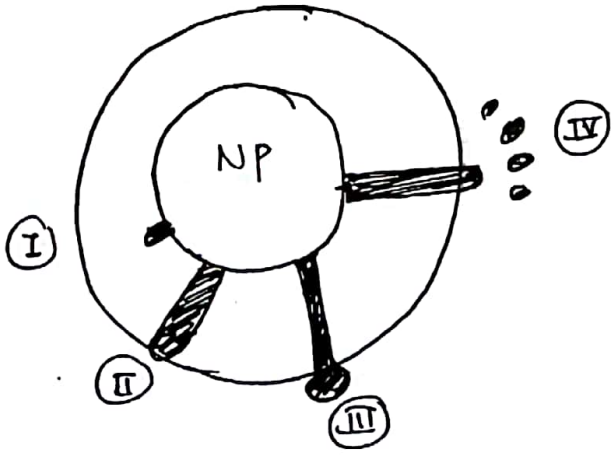
I → Disc Degeneration / Disc Bulge

II → Disc Protrusion

III → Disc Herniation / Extrusion

IV → Disc Sequestration.

SCHMORL's NODE



⇒ TYPES of PIVD - Depending upon the direction of prolapse

- POSTEROLATERAL/ PARACENTRAL — Lower level of N/V Root
- FAR LATERAL/ FORAMINAL — Upper level of N/V root

⇒ CLINICAL TESTS

1) Straight Leg Raise
2) Braggard's sign
3) Lasegue sign
4) Bowstring sign of McNAB

IOC :- MRI.

Mx- Conservative Mx :-

Bed Rest
NSAIDs
M/s Relaxant
} Acute Pain.

Intermittent Lumbar Traction
Superficial Heat
→ Hot packs
→ Infrared therapy
Deep Heat
→ Short wave diathermy
→ Ultrasonic therapy

TENS for Radicular pain.
Transcut. electrical N/V stimulation

Lumbar Belts / Corsets
Epidural steroids
Spine extension Exercises
} Chronic Pain

Indications for Sx

ABSOLUTE

1) Progressive neurological Deficit
2) Cauda equina Synd.
   ↳ If established Sx should be done in 6 hours or irreversible damage occurs

RELATIVE

1) Severe sciatic pain despite 6 weeks of conservative Rx
2) Recurrent incapacitating sciatica attacks. (>3 per year)

SURGERY – Decompression ± DISCECTOMY

* SURGICAL APPROACHES AIIMS May 2015
  - Laminectomy
  - Hemilaminectomy
  - Laminotomy (fenestration Sx)
    of choice → via microscope

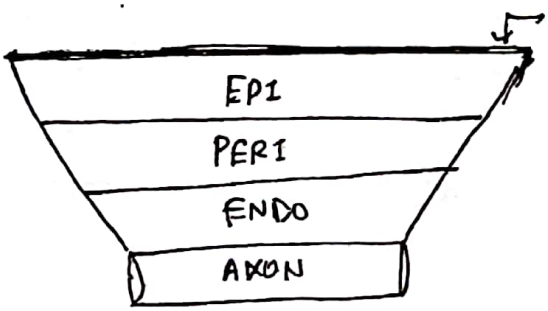
LAMINOPLASTY → was done in cervical canal stenosis

LIST - 8 Flag Signs of Backache (AIIMS 21 2015)

| RED | YELLOW |
|---|---|
| 1) Age < 20yrs | 1) Anhedonia |
| 2) Age > 50yrs | 2) Low mood |
| 3) Cachexia | 3) poor job satisfaction. |
| 4) Constant pain | 4) High functional limitation > 1 month |
| 5) Saddle anaesthesia | 5) psychological disturbance |
| 6) H/o malignancy/steroid use/ I.V. drug abuse | 6) Social ~~isolation~~ isolation |
| | 7) Alcohol dependence |

~~BARASTROP's~~

## PERIPHERAL NERVE INJURY




## SEDDOM's CLASSIFICATION

| NEUROPRAXIA | AXONTOMESIS | NEUROTMESIS |
|---|---|---|
| Physiological conduc" Block | Partial anatomical Conduction block. | Complete anatomical Conduc" Block. |
| Anatomy: Axon, N/v sheath → (N) | Axonal disrup" sheath (N) | Axon + sheath disrupted |
| Transient demyelination. | Surgery (I) | Surgery is compulsory |
| | | Rg. I |

Spontaneous recovery is a rule. ≤ 6wks

Eg. postural / positional
N/V palsy
Traumatic
Saturday Night palsy · RN

Rx - Dynamic cock up splint is done in Rx to avoid contractures & deformities Later

## BAASTRUP's DISEASE / KISSING SPINES

→ Degenerative Disease
→ Hypertrophy & Enlargement of adjacent spinous process in Lumbar spine in elderly pts
→ FOCAL MIDLINE Backpain which worsens in
⇒ extension
→ M/c Level - $L_4L_5$

Rx - Conservative

## LIST - 9 COMPRESSION NEUROPATHY

Carpal Tunnel sy - Median N/v @ wrist

Guyon's canal sy - Ulnar N/v @ wrist
(~~pitho~~ pisohamate canal)

Cubital tunnel sy - Ulnar N/v behind medial epicondyle

Radial Tunnel sy - Post. Int. N/v (motor Br).

Pronater sy - Median N/v between two head of pronator Teres

Kiloh Nevin sy - Ant. Int. N/v (motor Br. of median N/v

Piriformis sy - Sciatic N/v compression

Meralgia paraesthetica - Lateral cut. N/v of thigh

Cheralgia paraesthetica - Sup. sensory br. of Radial N/v

Morton's Metatarsalgia - Interdigital plantar N/v compression.
excruciating pain on squatting

NOTALGIA PARAESTHETICA - Sup. sensory neuropathy in infrascapular area.
Pruritus + Dysaesthesia
Rx - Pregabalin.

# MEDIAN NERVE

↓

Wrist

Superficial Br. → Palmar cutaneous Br. → Skin over thenar eminence

Carpal Tunnel

Deep Br. → Lateral Division MOTOR

1) Abductor pollicis Brevis
2) Flexor pollicis Brevis (sup. head)
3) Opponens pollicis
4) 1st Lumbrical

Sensory: thumb lateral half (IF)

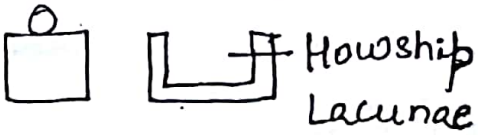
Deep Br. → Median Division SENSORY

1) Medial IF
2) MF
3) Lateral RF

MOTOR: 2nd Lumbrical

# OSTEON

- ORGANIC (30-35%)
  - MATRIX (90-95%)
    - PROTEINS
      - CP → Type I collagen
      - NCP → osteocalcin / Bone Gla protein ★
        - Osteonectin
        - osteopontin
      - Enzyme – Alkaline Phosphatase
  - CELLS (5-10%)
    - OSTEOBLASTS
      - CP
      - NCP
      - ALP
      - OSTEOID
        - $Ca^{2+}$
        - $PO_4^{-2}$
      - OSTEON
    - OSTEOCYTES
      - Resting / spent / Mature / Quiescent osteoblasts
      - Most abundant cells
      - Most long lived cells
    - OSTEOCLASTS
      - GIANT CELL FAMILY
      - Monocyte-macrophage cell lineage
      - 2R's
        - ReModelling
        - Resorption of Bone
- INORGANIC (65-70%)
  - MINERALS
    - $Ca^{2+}$
    - $PO_4^{-2}$
    - Calcium hydroxy apatite



# PHYSIOLOGY



CALCITONIN → ↓ S. $Ca^{2+}$

PTH → Osteo Blast (RANK-L)* → OSTEOCLAST → Bone Resorption → ↑ S. $Ca^{2+}$

## ANOTOMY

Long Bone has 4 Layers

Epiphysis
Physis/growth plate
Metaphysis
Diaphysis

## EPIPHYSES

### CLASSIFICATION

1) PRESSURE – Body wt bearing
eg. Head of femur

2) TRACTION – attachment of to soft tenue
eg. Tuberosities (humerus)
Trochanters (femur)

3) ATAVISTIC – eg. Coracoid process

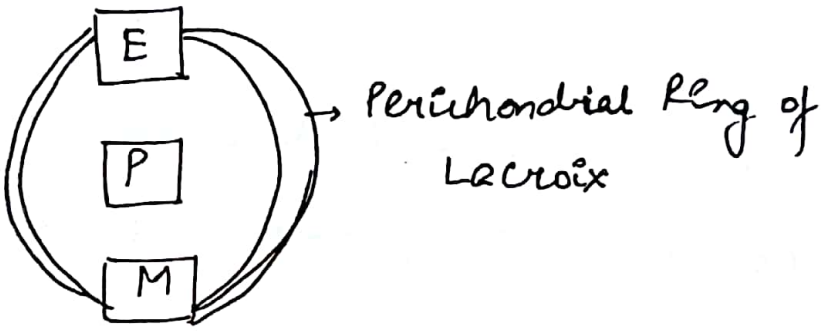
4) ABERRANT

Eg. epiphysis @ Head of 1st Mc.

## PHYSIS

STRUCTURE Real People Have Career options.

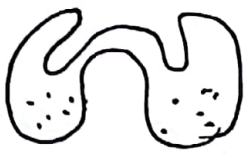
1) Resting zone
2) Proliferative zone
3) Hyperproliferative zone
4) Zone of calcification
5) Zone of ossification.




## METAPHYSIS

Loose / spongy / cancellous
Highly vascular

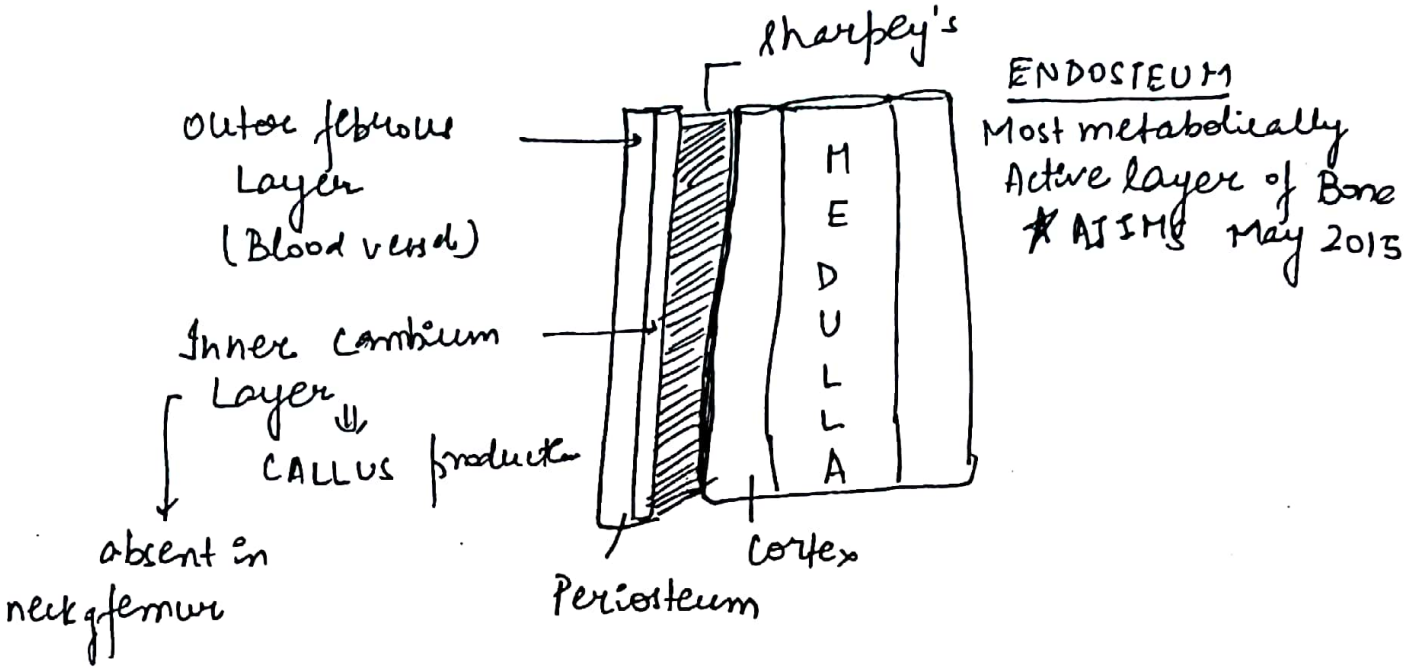
Metaphyseal # → Higher union potential common
↳ malunion common
Non-union rare



HAIR PIN LOOP of vessels

blood vessels → dilated tortuous
→ Stagnation of blood
↓
Ischaemia ← Stasis
↳ Infection → osteomyelitis

## DIAPHYSIS / SHAFT




## LIST 10 BASICS (ONE LINER)

Most abundant cell of Bone = Osteocyte

Most long lived cell of Bone = "

Clavicle (long Bone) has no marrow cavity

PHYSIS - Temporary 1° cartilaginous joint

HUETER VOLKMANN's LAW:-

Compressive forces across physis ⇒ INHIBIT GROWTH

Shearing / tensile forces " " ⇒ PROMOTE GROWTH

Ossification centres present @ Birth

| | |
|---|---|
| Distal Femur | Fe |
| Calcaneum | Cal |
| Talus | Tal |
| Cuboid | Cum |

Capitate:- 1st Carpal Bone to ossify [@ 2 month] - AIIMS Nov 2017

## LAW OF OSSIFICATION

2° ossification centre that appears 1st fuses last
[Fibula doesn't follow this rule]

## METABOLIC BONE DISORDERS

(I) OSTEOGENESIS IMPERFECTA / Brittle Bone Disease / Fragilitas Ossium / Vrolik Lobstein Disease

COL1A1 gene mutation
↓
Glycine substitution.
↓
No cross linkage in Type I collagen
↓
No Tensile strength in bone
Type I collagen synthesis defect

Clinical Spectrum:-
Pre school child → Multiple Long Bone # (PATH #)
No H/o Trauma
↓
Blue Sclera
poor & delayed dentition

X-Ray - 3D
Diaphyseal
Different stages of Healing
Deformities

Mx- 1) Braces to prevent further deformity
2) Bisphosphonate
3) Corrective osteotomy
(realignment osteotomy)
4) Sofield Miller Surgery
4) Internal fixation = Telescopy nail
Bailey & Dubow Rod.

D/D :- BATTERED BABY SYNDROME / Caffey's Synd.

Pre school child
Multiple long bone #s
Signs of violence (+)
X-Ray = METAPHYSEAL #s
(distal radius/ulna)

| CORONER | BUCKET HANDLE #. |
|---|---|

(II) OSTEOPETROSIS / Marble Bone Disease/
Albers chongberg Disease
Defect in Carbonic Anhydrase II Proton Pump
⇓
Defective osteoclastic bone Resorp^n
⇓
Excessive deposition of (N) osteoblastic Bone
formation
⇓
THICK/ DENSE/ SCLEROTIC BONE

C/F :- Infants - Bone Marrow failure
↓
Pancytopenia
↓
Recurrent Infn"
↓
osteomyelitis of mandible
↓
Hepatosplenomegaly
↓
Recurrent hemorrhage

X-Ray of long Bone - 2E → Endobone sign
Erlenmeyer Flask.
Deformity.

X-Ray Spine - RUGGER JERSY SPINE (Renal osteodystrophy > osteopetrosis)

(III) PAGET'S DISEASE / Osteitis Deformans

High turnover Bone Disease
Excess osteoblastic bone formation &
Excess osteoclastic bone resorption
M/C Bone → PELVIS
Age Grp → 4th / 5th decade
Asymptomatic in most cases
Western > Asians.
1st M/C Symptom - BACK PAIN

Δ :- BIOCHEMICAL → ALP ↑↑↑

BONE BIOPSY → Gold Std.

Mosaic pattern

X-RAY-

OSTEOPOROSIS CIRCUMSCRIPTA

COTTON WOOL SKULL

TAM O SCHANTER SIGN


FLAME SIGN / BLADE of GRASS SIGN / ADVANCING WEDGE SIGN

PICTURE FRAME SPINE

BRIM SIGN (Thick sclerotic iliopectineal line)

M/C premalignant Lesion for 2° osteosarcoma

DOC - Bisphosphonates.

(IV) OSTEOMALACIA / MALACOSTEON / Hungerwerk Osteopathy

Qualitative Bone defect

O' Blast → osteoid $\xrightarrow[PO_4^{-1}]{Ca^{2+}}$ Osteon.

Cause-

↓ dietary intake of $Ca^{2+}$

Poor GI absorption

Poor Renal tubular Reabsorption

→ Deficient $Ca^{2+}$

↓

Lack of properly formed osteon

↓

Compensatory ↑ in Osteoblastic activity

↓

↑↑ osteoid ↑↑

$\frac{\text{Osteoid}}{\text{Osteon}} > 1.$

C/F - young ♀ (15-40yrs)
Bone pain
Polyarthralgia.
Proximal myopathy
H/C – Spine

Biochemical Analysis
S. $Ca^{2+}$ ↓
S. $PO_4^{2+}$ ↓
S. ALP ↑↑↑

Bone Markers of Formation
serum levels of Type I collagen
osteocalcin
osteonectin
osteopontin.

X- Ray - SPINE → Fish mouth spine 
PELVIS → LOOSER's ZONES. (PAI)
Emil Looser
Ribbon shaped translucencies
Cortical infarct / pseudo #
Milkman's #.
No displacements
No callus.

SITES
a) pubic ramus
b) NOF
c) Ribs
d) clavicle
e) Outer border of scapula
f) Subtrochanteric fem

Also seen in.- Renal osteodystrophy
Fibrous dysplasia
Hypophosphatasia
Osteogenesis Imperfecta

Mx- 1) Diet rich in Calcium → Milk
Green Leafy vegetables

vit D – Cod/fish oil
sunlight

2) Supplements

## (V) OSTEOPOROSIS

» Porous Bone Disease

» QUANTITATIVE Bone Defect

M/C R/F ⇒ Post Menopause

M/C cause ⇒ senile / Ageing

Drugs → corticosteroids → Thyroxine
→ Anticonvulsants. → GnRH analogue

↓

2° osteoporosis.

Excess osteoclastic Bone Resorption > (N) osteoblastic Bone formation.

4F-
Perimenopausal ♀
Mostly asymptomatic
Earliest symptom → BACK PAIN
M/C complication → Pathological #.
(V. Body of $T_{12}$)

Biochemical Analysis
S. $Ca^{2+}$ (N)
S. $PO_4^{2-}$ (N)
S. ALP (N)

Bone Markers for Resorption
serum & Urine levels of
Type I collagen degradation products
Proline
Hydroxyproline
Deoxypyridinoline
N - Telopeptides
C - Telopeptides.

X-Ray - SPINE
→ Fish Mouth spine

DEXA SCAN - Gold Std
(Dual energy X-Ray Absorptiometry)
WHO defines osteoporosis → T. score $\leq -2.5$

Mx

DRUGS

① Antiresorptives
→ Bisphosphonates (DOC)
→ Denosumab
MOA = ⊖ RANK-L

Sx

vertebroplasty
kyphoplasty (better)
↓
percutaneous Inj" of Bone cement in ν Body

② OSTEOPROMOTIVES
Teriparatide
Recombinant PTH in low intermittent doses
DOC for Bisphosphonate resistant osteoporosis

③ ANTIRESORPTIVE + OSTEOPROMOTIVE
Strontium Ranelate

FISH MOUTH SPINE ⇒ Osteomalacia > osteoporosis

RUGGER JERSEY SPINE ⇒ Osteopetrosis < Renal osteodystrophy

Excess Consumption of Bisphosphonates

Dose — Duration

ADYNAMIC BONE SYNDROME

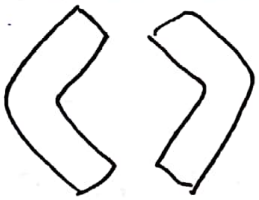
Clinical — X-Ray

Vague hip pain — Atypical Subtrochanteric femur #.

Transverse
Lateral cortical thickening
Medial spike
No communication

Risedronate = 35mg tab weekly
Ibandronate = 150mg tab monthly
Zolendronate = 5mg I.V. yearly

Q.



GENU VARUM
Bow Legs
M/C Cause
Children: Rickets / Idiopathic
Adults: O.A.

GENU VALGUM
Knock Knee
M/C Cause
Children: Idiopathic > Rickets
Adults: R.A.

* Father 2yr child GENU VARUM

Rickets — Idiopathic

$Ca^{2+}$ ↓ $PO_4^{2-}$ ↓ Vit D ↓ ALP ↑↑↑

vit $D_3$ intramuscular inj" of
oral Vit D × 6weeks

↓

6 weeks Later

Genu varum corrects

Genu varum persists

↓

Repeat ALP

ALP ↑↑↑

↓

Vit D resistant
Renal Rickets

↓

ped. nephrologist

Rickets — Best Astic → x-Ray
Best Prognostic → ALP

ALP ⊗

↓

Corrective osteotomy

# CLAVICLE

## ANATOMY

LONG BONE → Horizontal
- Subcutaneous
- → Intramembranous ossification (IMO)
- Two 1° , one 2° ossification centre

1st Bone to start ossifying (5th week IUL)
Last " " get ossified

Medial 2/3rd → cylindrical
Lateral 1/3rd → Flat

Junc" of medial 2/3rd , Lateral 1/3rd = weakest point of clavicle

## FRACTURE CLAVICLE

M/C # overall / delivery / newborn
M/c site - Junc" of Medial 2/3rd , Lateral 1/3rd
M/C complication - Malunion.
Most serious complication - N.V. Injury → Subclavian vessel
↓
Brachial plexus (lower Trunk)

Mx- CONSERVATIVE :- Figure of 8 bandage
Clavicular Brace

SURGERY → Indications of Sx

1> N.V. Injury

2> # @ Lateral end of clavicle ± A.C. Joint disruption

3> cosmetic defect

4> Floating shoulder
(I/L scapular/glenoid neck #
mid shaft clavicle #)

# SHOULDER JOINT

## ANATOMY

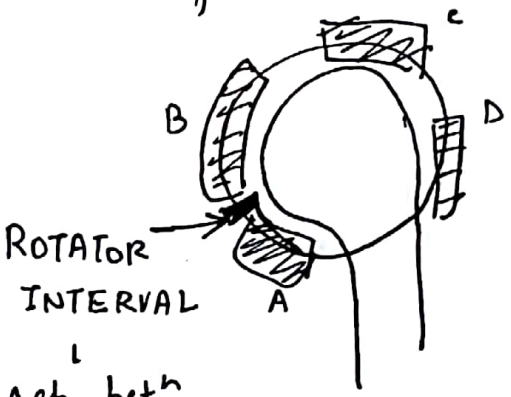
M/c Joint to undergo dislocation shoulder

WHY?

1) Synovial Joint (Ball & socket type)
Glenoid / Head of humerus = 1/3

2) Excess mobility ↓ stability

3) Inj. Deficiency of Rotator-cuff




↓
gap bet^n Subscapularis & Supraspinatus

## ROTATOR CUFF

Capsule +

Ⓐ Subscapularis ⇒ Lesser Tubercle
↳ Missed/forgotten m/s I.R. @ shoulder

Ⓑ Supraspinatus → 0-15 Abduction

Ⓒ Infraspinatus ⇒ Greater Tubercle

Ⓓ Teres Minor → E.R. @ shoulder

## ** SHOULDER STABILISER

**STATIC**

1) Capsule
2) Glenoid Labrum ~(50%)
3) Negative intra articular pressure
4) Glenohumeral ligament
   - S.GHL → 0° Abduction
   - MGHL → 45° "
   - IGHL → 90° " ****

**DYNAMIC**

1) Rotator cuff ≤ v Imp
2) Deltoid
3) Biceps

# TRAUMA AROUND SHOULDER

## SHOULDER DISLOCATION

CLASSIFICATION

| | A.S.D. | P.S.D | I.S.D |
|---|---|---|---|
| M/c subtype ↓ subcoracoid | >>> (95-98%) | > (3-4%) | (1-2%) |
| Mech. of Injury | Abd" ER | Add" IR | Hyperabduc". |
| Examples | Vigorous Throwing of Ball | Epilepsy, Electric shock | Pt. locks arm by side of head (Salute posture) |
| | PAINFUL | Minimally painful/painless | |

X-Ray of PSD
Electric Bulb sign
Empty Glenoid Sign

## CLINICAL TESTS for A.S.D.

DUGAS TEST-
Inability to touch opposite shoulder

CALLAWAY'S TEST-
Paraxillary palpation of Head of humerus

HAMILTON RULER TEST-
Ruler touches both acromian & Lateral condyle simultaneously

## COMPLICATIONS

M/C (overall) → Recurrent

M/C (immediate) → Injury to circumflex Br. of Axillary N/v

M/C (delayed) → Recurrence

Mx- Closed Reduction.

* Methods of CR -

1) Hippocratic method
2) Stimsons Gravity Technique
3) Modified Kochers Technique (TEA-1)
[Traction - ER — Adduction → IR]

# RECURRENT SHOULDER DISLOCATION

## MATSEN's CLASSIFICATION

### TUBS
Torn Loose

(T) Traumatic

(U) Unidirectional
M/c → Ant.

(B) Bankart's Lesion
* Avulsion of Ant. Inf. glenoid Labrum

* M/c cause of Recurrent ASD.

HILLSACH's LESION
* Bony defect @ posterolateral aspect of Head of Humerus due to repeated impaction against glenoid

* 2nd M/c cause of Recurrent ASD

(S) Surgery
↳ Arthroscopic Bankart/ Hillsach's

### AMBRI
Born Loose

(A) Traumatic

(M) Multidirectional

FULCRUM Test - Ant. Instability
JERK test → Post. Instability
Sulcus test - Inf. »

(B) ilateral
MRI → capsular Laxity
Connective tissue disorder
Marfan / Ehler Danlos variant

(R) ehabilitation.
Isometric Rotator Cuff strengthening exercise

(I) nternal Capsular Closure

# CAUSES OF RECURRENT PSD

* REVERSE BANKART LESION

Detachment / avulsion of Post. Inf. glenoid labrum

(BAI → PI)

* REVERSE HILLSACH'S LESION

Bony defect in Antero-medial aspect of Head of Humerus.

(TROUGH SIGN)

(opp. to Hillsach literally)

# ROTATOR CUFF TEAR

young ♂ (20s/30s)

↓

Pain, swelling } Ⓡ shoulder

↓

O/E - Limitation of initiation of Abd°

↓

1st Inv = USG

IOC = MRI

↓

Acute traumatic R.C. Tear

↓

TOC: Arthroscopic RC Repair

↓

Long Later

↓

young ♂ (30s/40s)

↓

↓ Chronic

MRI. Irreparable Rc tear

↓

Rx OC = A'scopic R.C. Tendon Tranfer using deltoid / Biceps

↓

10 yrs Later

↓

Elderly ♂ (50s / 60s)

↓

Irreparable R.C. tear +
2° Glenohumeral arthritis

↓

Rx O.C.- Reserve shoulder arthroplasty

## LIST- 11

M/C #

OVERALL = clavicle

Newborn - clavicle

Delivery - clavicle

Difficult Delivery - Humerus

Children - Greenstick # (Radius > Ulna)

Children around elbow - Supracondylar # Humerus

M/C CARPAL BONES - # → Scaphoid

Dislocation → Lunate

M/c - TARSAL BONES

# - Calcaneum

Dislocation - Talus.

M/c Bone

open # - Tibia

Pathological # - ↓ Body ($T_{12}$)

Stress # - Tibia > shaft of 2nd metatarsal (MARCH #)

M/c Joint to undergo ~~Shoulder~~ dislocation = Shoulder

LC " " " = knee

M/c Joint to undergo Recurrent " = shoulder

L/c " " " " = Ankle

M/c - Tendon injury supraspinatus > Tendoachilis

M/c Ligament to undergo sprain A.T.F.L. (ant. Talo fibular Lig)

STRONGEST LIGAMENT = BIGELOW's Lig
Iliofemoral Lig (IFL)

M/c Peripheral N/v injury - Radial n/v

Best Prog (PNI) = Radial n/v

Worst Prog (PNI) = Ulnar n/v

Worst Prog despite $S_x$ = Sciatic n/v
Repair

M/c # due to Fall on Out Stretched HAND (F.O.O.S.H.)

Children = S.C. # Humerus

adults = # Scaphoid

Elderly = Colle's #

M/c Arterial Injury = Popliteal

LARGEST CARPAL BONE = Capitate

1st carpal Bone to ossify = Capitate

M/c Joint to undergo Dislocation in children = Elbow

L/c Carpal Bone # = Trapezoid

Most centrally located carpal Bone = Capitate

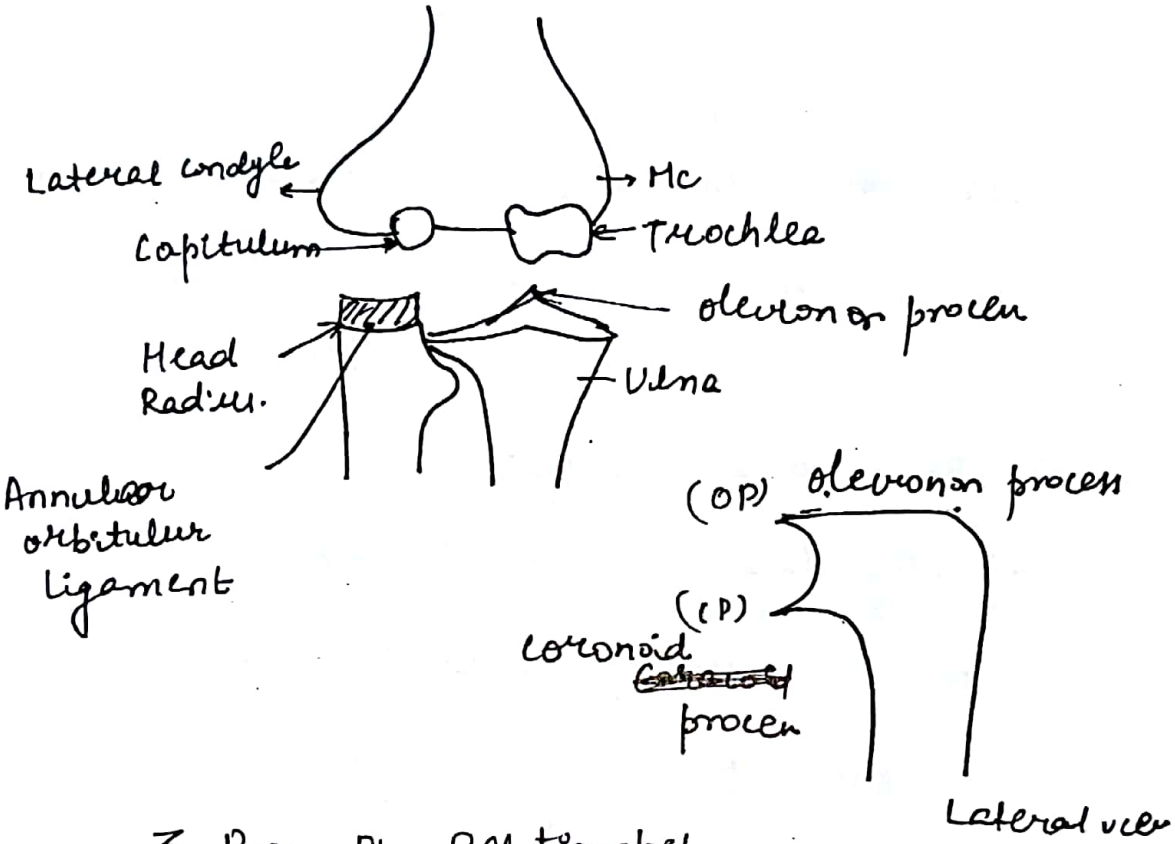
M/c Tarsal Bone to develop stress # = Navicular.

Last Carpal Bone to ossify = Pisiform

# ELBOW JOINT

→ Synovial Joint (Hinge Joint)

Radiocapitellar < Ulnotrochlear JT




3 Bony Pt. Relationship

olecranon LC MC

Elbow @ flexion → △

Elbow @ extension → ——

ALTERED – # LCH / # MCH / # olecranon

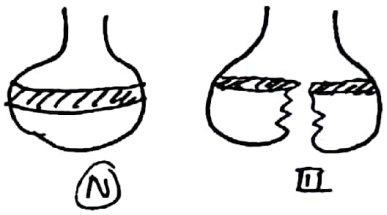
NORMAL – SC # H.

# SALTER HARRIS CLASSIFICATION (I-V)

**I** No obvious # line
Minor - major physeal slip
eg. slipped capital femoral epiphysis

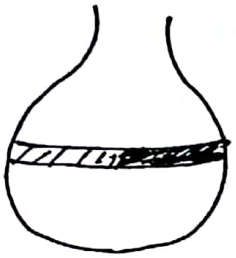
**II** Extra-articular injury
Triangular metaphyseal Bone fragment
(Thurston Holland sign)
eg. SC # Humerus

**III** Intra articular injury
Physeal # line extending into epiphysis
eg. lower end of Tibia #




**IV** 2nd MC type
Intra-articular injury
Rotation of distal fragment
↳ articular surface becomes non articular & vice versa
eg # LCH # of necessity ⇒ ORIF is compulsory

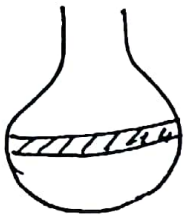
**V** Worst prognosis
Least common type
due to fall from height



Initial x Rays (N)
partial / complete physeal crushing injury
IOC = MRI

Complication:- Growth disappear
Limb length deformities

RANG - VI Injury to Perichondrial Ring of La' croix.



## FRACTURES OF DISTAL HUMERUS

### (A) SUPRACONDYLAR # HUMERUS

M/C # due to F.O.O.S.H. in children
MC # in children around elbow
Salter Harris type II
Extra-articular #
Three Bony pt Relationship (N)
M/C → Mode of Injury → F.O.O.S.H.
→ Mech. of Injury → HYPEREXTENSION

## TYPES

- EXTENSION (96%) — Displacement of distal fragment
  - Dorsal / Posterior
    - **Posteromedial** > Posterolateral
      - M/C Displacement overall
  - Volar / Anterior
- FLEXION (4%)

## GARTLAND'S CLASSIFICATION

| (I) | (II) | (III) |
|---|---|---|
| Minimally displaced | Unicortical | Complete # |
| undisplaced | Angulation (+) | Bicortical # |
| Impacted # | No displacement | Completely displaced # |
| X-Ray (N) | | |
| Mx Above elbow POP slab/Cast x 3 weeks | CR + Above elbow POP slab/Cast | CR + K-wire Fixation |

## COMPLICATIONS of SC#H

1) M/C Malunion → CUBITUS VARUS (Gunstock Deformity)
2) Neurological Injuries
3) Vascular Injury (MC - Brachial artery)
4) Compartment
5) Volkmann's Ischaemic contracture
6) Myositis ossificans

# CUBITUS VARUS



→ Gun stock Deformity
→ Malunited SC #H most commonly compliate this way
→ occurs due to Uncorrected medial Tilt
→ static deformity
→ cosmetic "
→ Mx

FRENCH OSTEOTOMY — Modified French osteotomy

Incision: post midline — posterolateral

Whole Triceps — Triceps detachment — Lateral Triceps

Explored · kept safe — Ulnar N/V — Not explored

Broken — Medial cortex — Intact

## NEUROLOGICAL INJURIES in SC #H

Usually neuropraxia
Recover Transiently
M/C Nerve Injured in SC #H
↳ overall = AIN br. of median N/V
↳ posterolateral = " displacement
↳ posteromedial displacement = Radial N/V

AH/volar displacement = ULNAR. N/N

# COMPARTMENT SYNDROME

## ETIOLOGY

↑ contents

1) Bone :- #

2) M/c #
children = SC # H
adults = # prox · Tibia

3) Muscle → crush
Traumatic Rhabdomyolysis

4) Vessel → vascular injury

↓ size

1) Tight circumferential POP dressing / Cast

2) Post Burn contractures

e/F :- "7P"

1st Symptom = Pain.

1st sign = Pain on passive stretching [Most Astic/ Sensitive]
(STRETCH TEST +ve)

Pallor
Paraesthesia
Paralysis
Pulselessness → late feature
→ Not Astic criteria

Pressure ↑↑↑ (N) 6 - 12 mm Hg
Astic ≥ 30 mm Hg

Mx - fasciotomy

# V.I.C.

Compartment Syndrome → Ischaemia → Necrosis of M/s

↓

contracture ← fibrosis

## Volkmann's Deformity

Forearm → thinned / atrophied

Wrist → flexed

Palm → Hollow

MCPJ → Hyperextended

PIPJ → Flexed

Mx of V.I.C. ⇒ GRADE WISE

**Mild**

Passive stretching / correction.

Turn Buckle Splint

**Moderate**

Maxpage Sx

Distal sliding of common flexor origin

**Severe**

Proximal row carpectomy

## MYOSITIS OSSIFICANS

Muromer (no m/s inflammation)

Heterotrophic ossification.

Ectopic, benign, pathological bone formation in soft tissues

⇒ **Myositis ossificans traumatica**

child SC #H

Passive manipulation/ massage

Mechanical stimulus to periosteum

ectopic bone formation.

Acute MOT ⇒ Pain relief/ Ice packs/ Elevation

Chronic MOT ⇒ Sx excision of bone block in toto

⇒ **Myositis Ossificans Progressiva**

Rare,

AD inheritance

fatal Cond$^{n}$

children < 6yrs

Microdactyly

Bone formation in cardiac M/s

Diaphragm, Tongue, EOM M/s spared

Death due to resp. failure

M/C Joint involved in Myositis ossificans = ELBOW > HIP.

## (B) # LATERAL CONDYLE HUMERUS

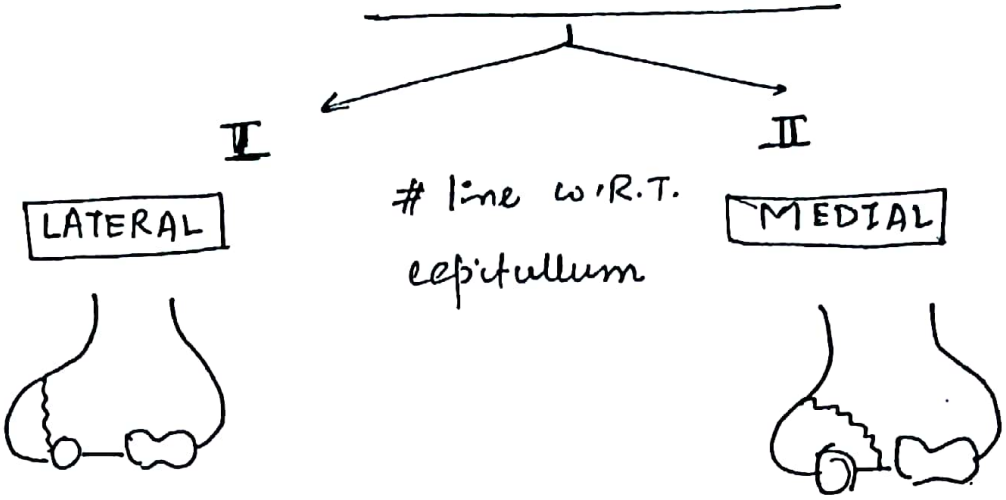
Intra-articular

Salter Harris type IV

3- Bony Paint Relationship ALTERED

Less common in incision than SC #H

## MILCH CLASSIFICATION




M/C Comp. → Lateral spur formation.
due to ossification under periosteum

M/C complication Requiring Rx = NON UNION
↓
Cubitus Valgus

Dynamic
Functional

Mx = Milch Osteotomy.

M/C N/V Injury :- Tardy Ulnar N/V Palsy
(due to progressive increase in
cubitus valgus)

Mx - # Lateral condyle humerus is # of necessity
ORIF is the only Rx possible

# # SHAFT OF HUMERUS

## HOLSTEIN LEWIS #

oblique, displased # of shaft of humerus @ Junc of upper $^{2}/_{3}^{rd}$ & Louser $^{1}/_{3}^{rd}$ of shaft. ~ Radial N/V ~~Inj~~. Palsy.

## LIST- 12 :- CLASSIFICATION IN ORTHOPAEDICS

Graff's - DDH
(USG)

Kashiwagi (MRI) = DDH

Stulberg's
Catterall
Salter thompson
Herrings
→ Perthes Disease

~~Atke~~ Aitken's - Prox. femoral focal deficiency

Boyd's - Tibia pseudoarthrosis (C.P.T.)
↓
Congenital pseudoarthrosis of Tibia

Stecberg's - A.V.N.

BADOS - Monteggia's #

Mason's - # Head Radius

MATSENS - Recurrent shoulder dislocation

NEER's - # proximal humerus

Bayne & Klug - Radial Club Hand

Arnold & Hilgartner's - Hemophiliac arthropathy

Outerbridge's — Articular cartilage arthritis

Ahlback's - OA knee

Rockwood - Acromioclavicular Joint

Judet & Letournel - # Acetabulum

Winquist & Hansen - # SOF

Schatzkers - # prox. Tibia

★ Hawkins - # Neck Talus

Sanders (CT) - # calcaneum

Essex Lopresti - (X-Ray) # Calcaneum

ALLmani's
Frykmann's
Fernandez
Melones
] # distal end of radius

Tiles
Young & Burgess
] # pelvis

Pipkins → # head femur

Salter & Thompson's - Perthes disease

Salter & Harris - Physeal Trauma

Thompson & Epstein - Post- Hip Dislocation

## List- 13 # / INJURIES ~ Eponyms (Elbow/ forearm/ wrist)

1) Pulled Elbow / Nursemaid's Elbow.

Distal subluxation of Head of Radius → widening of Radio capitellar Groove

↓

Annular/ orbicular ligament gets stuck in widened radiocapitellar groove

↓

→ child locks elbow in extension, doesn't allow anyone to touch. → Apprehension test +ve

Mx = Closed Reduction

2) HOTCH KISS & TERRIBLE TRIAD

Post. elbow subluxation / dislocation

# Head Radius

# Coronoid process of ulna

3) ESSEX LOPRESTI # DISLOCATION

Distal Radio Ulnar Jt. Disruption

Interosseus membrane disruption.

# Head Radius.

4) MONTEGGIA's #

# of proximal one third of Ulnar shaft + Radial Head dislocation.

BADO's classification (I - IV) → I - M/c overall [redacted]

II - [redacted]

M/C N/V Injured - P.I.N.

# of necessity (ORIF is compulsory)

5> GALEZZI's #/ REVERSE MONTEGGIA's #/ PIEDMONT #

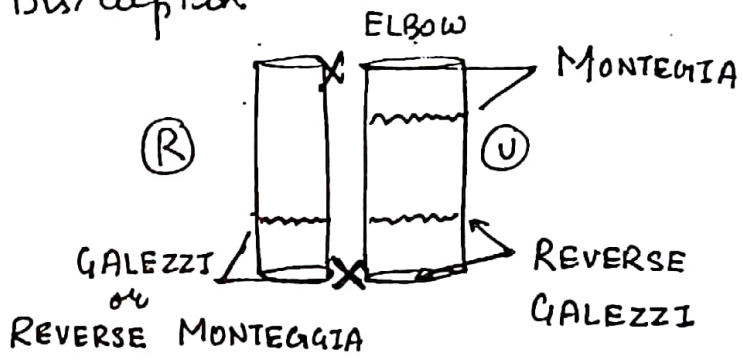
# shaft of Radius @ Junc' of middle + distal 1/3rd of shaft ~ D.R.U.J' disruption.

# of necessity (ORIF is compulsory)

3 terms more common than Monteggia's #

6> REVERSE GALEZZI's

# of shaft of ulna (@ Junc' of middle. Distal 1/3rd) ~ D.R.U.J. Disruption




7) LAUGIER's #

# of Trochlea

8) HUME's #

→ # of olecranon (prox. ulna) ~ ant. elbow of. dislocation of Radial Head

→ monteggia's variant

9) NIGHSTICK #

Isolated # of shaft of ulna

MOI - direct trauma to forearm while in a defensive stance

10) GREENSTICK #:

[redacted] children.

unicortical # of forearm bones (Radius & Ulna) ~ concavoconvex deformity

11) BARTON's #

Intra-articular # of distal end. radius (DER) ~ c
Radio-carpal joint subluxation.

* Barton's Disease → Vit C ↓ scurvy
Vit D ↓ + Rickets

12) CHAUFFER's #/ HUTCHINSON # /BACKFIRE #

Intra-articular # of distal end of radius ~ #
Radial Styloid process.
Radio carpal Jt. (N)

13) SMITH's #/ REVERSE COLLES's

Extra-articular # of Distal end of Radius ~
volar/anterior displacement of distal fragment
M/c comp^ - Malunion ('Garden spade deformity

14) COLLE's #

Extra-articular # of Distal end of radius ~
dorsal/posterior displacement of distal fragment
(Dinner fork Deformity)

ABRAHAM COLLES

Displacements :- DILS (ALLMC)

- Dorsal → characteristic
- Impac^
- lateral
- Supination

Complications of Colle's #

a) M/c → finger stiffness
b) 2nd M/c → Malunion (Dinner fork defor[redacted] pseudo modelling

c) Carpal Instability

a) carpal tunnel

e) Rupture of extensor pollicis longus

f) Post. Traumatic shoulder stiffness

g) Sudeck's Osteoneurodystrophy
(reflex sympathetic dystrophy)

Mx - COLLE's CAST (Hand shake cast)

- 15° pronation
- 15° palmar flexion
- 15° ulnar deviation

15) SUDECK's OSTEONEURODYSTROPHY

Reflex sympathetic dystrophy

CRPS I (complex Regional Pain syndrome)

- (I) Bony / Soft tissue injury
- (II) N/v Injury

Rare / delayed complication of Colle's #

Pain (severe / Intense) out of proportion

swelling (Stiffness / thin, shiny, stretched skin)

Hyperaesthesia

. Unenhibited v sympathetic stimulation.

[redacted] over

X-Ray = Osteopenia (↑ blood flow in sympathetic stimulation)

Mx = 1) sympatholytics

2) NSAIDs/ M/s Relaxant (amitryptiline)

3) Sympathetic Ganglion Blockade

4) Surgical Sympathectomy

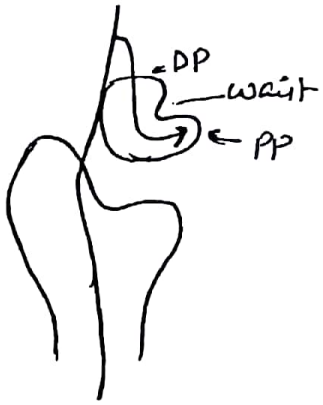
5) Vit C = prophylactic Role

16) # SCAPHOID

M/c Carpal Bone #

M/c # due to FOOSH in adults

Retrograde blood flow
(distal → proximal)




M/c mode of injury → FOOSH

M/c site → Waist

Scaphoid = floor/Base of anatomical snuff Box

C/F- Tenderness / swelling in anatomical snuff Box

X-Ray - Oblique
PA view in 15° Ulnar Deviation.

M/c Complication - NON UNION.

2nd M/c ↓ - AVN of prox. pole

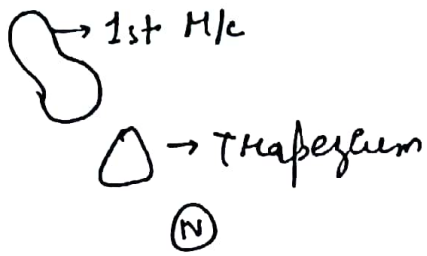
Mx - undisplaced # → scaphoid/ Glass holding cast
- displaced # → O.R.I.F. ē Herbert screw

17) BENNETT's

I/A # of 1st Mc

OBLIQUE

more displaced

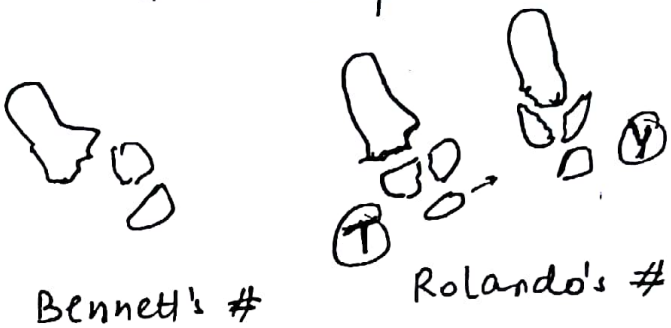



18) ROLANDO's #

I/A # of 1st M/c

T/Y shaped communited

# less displaced




Bennett's #

Rolando's #

19) BOXERS

# Neck of 5th Metacarpal

(M/C Metacarpal #)

20) MALLET FINGER

Avulsion of extenser tendon from dorsal aspect of Base of distal phalanx → flexion deformity @ D.I.P. joint

21) JERSEY FINGER

Avulsion of F.D.P (flexor Digitorum Profundus) from Volar aspect of base of distal phalanx

22) Gamekeeper's / SKIER's THUMB

Avulsion of Ulnar collateral ligament (ULL) from 1st metacarpophalangeal Jt.

## 23) MADELUNG DEFORMITY

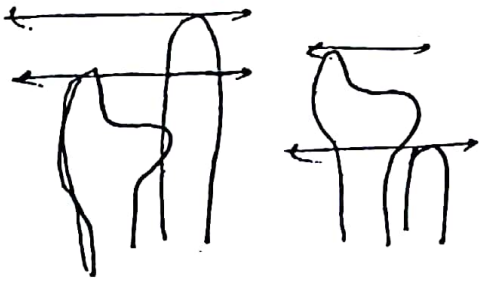
B/L pediatric congenital deformity

Growth retardation of ulnar aspect of distal end of radial physis.

DISTAL ULNA :- Thick
prominent
⊕ Ulnar variance

Dinner Fork Deformity

Mx = osteotomy
(DARRACH's PROCEDURE)



⊕ ULNAR VARIANCE — ulnar plus deformity

⊖ ULNAR VARIANCE — Ulnar minus deformity

## 24) RADIAL CLUB HAND

Longitudinal Deficiency Disorder

complete absence of radius > partial absence of radius.

Thumb/ scaphoid/ Trapezium = Absent

BAYNE & KLUG CLASSIFICATION

B/L pediatric Congenital deformity

⇒ Syndromic Associations ★★(POT)

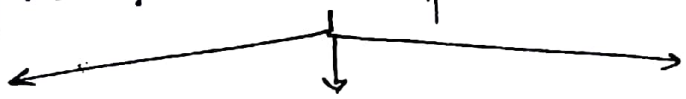
TAR Syndrome = Thrombocytopenia
Absent Radius

HALT ORAM Syndrome = ASD
fanconi's anaemia
Radial club hand

VACTER Syndrome = (V) ertebral Anomalies
(A) nal Atresia
(TE) Tracheo-oesophageal fistula
(R) enal & (R) adial dysplasia

25) POLY DACTYLY

M/c Congenital/ Hand malformations



Pre-axial > Central Post-axial

Thumb

26) SYNDACTYLY

fused/ conjoined/ webbed finger

COMPLETE (Syndactylism) < INCOMPLETE

M/c site:- Middle & Ring finger

Apert's syndrome-
craniosynostosis

Poland's Syndrome-
I/L absence of Pec. Major

27) PREISER's DISEASE

Non traumatic AVN of Scaphoid

28) KEIN BOCK's DISEASE

pressure Osteochondritis non-traumatic AVN of LUNATE

29) KAPLAN INJURY

Irreducible dislocation of finger (M/C- IF) / Index finger @ MCP JT

## LIST- 14 TESTS IN ORTHOPAEDICS

Pen Test- Abductor Pollicis Brevis (MN)

Card Test- Palmar interossei (UN)

Elgawa's Test- Dorsal interossei (UN) → hold the fingers, ask to abduct

Book Test/ Froment's sign- Adductor pollicis (UN)

PHALEN's TEST Carpal Tunnel syndrome

DURKAN's TEST " "

COZEN's TEST - Tennis elbow (Lateral epicondylitis)

YERGASSON's Test- Bicipital Tendinitis

LIFT OFF TEST- subscapularis

DUGAS TEST
CALLAWAY's T
HAMILTON RULER T
} → Ant shoulder Dislocation

FINKELSTEIN's T- De Quervain Tenosynovitis

ALLEN's T- patency of sup. Palmar Arch

ADSON's T- thoracic outlet syndrome

THOMAS T- Flexion deformity @ Hip

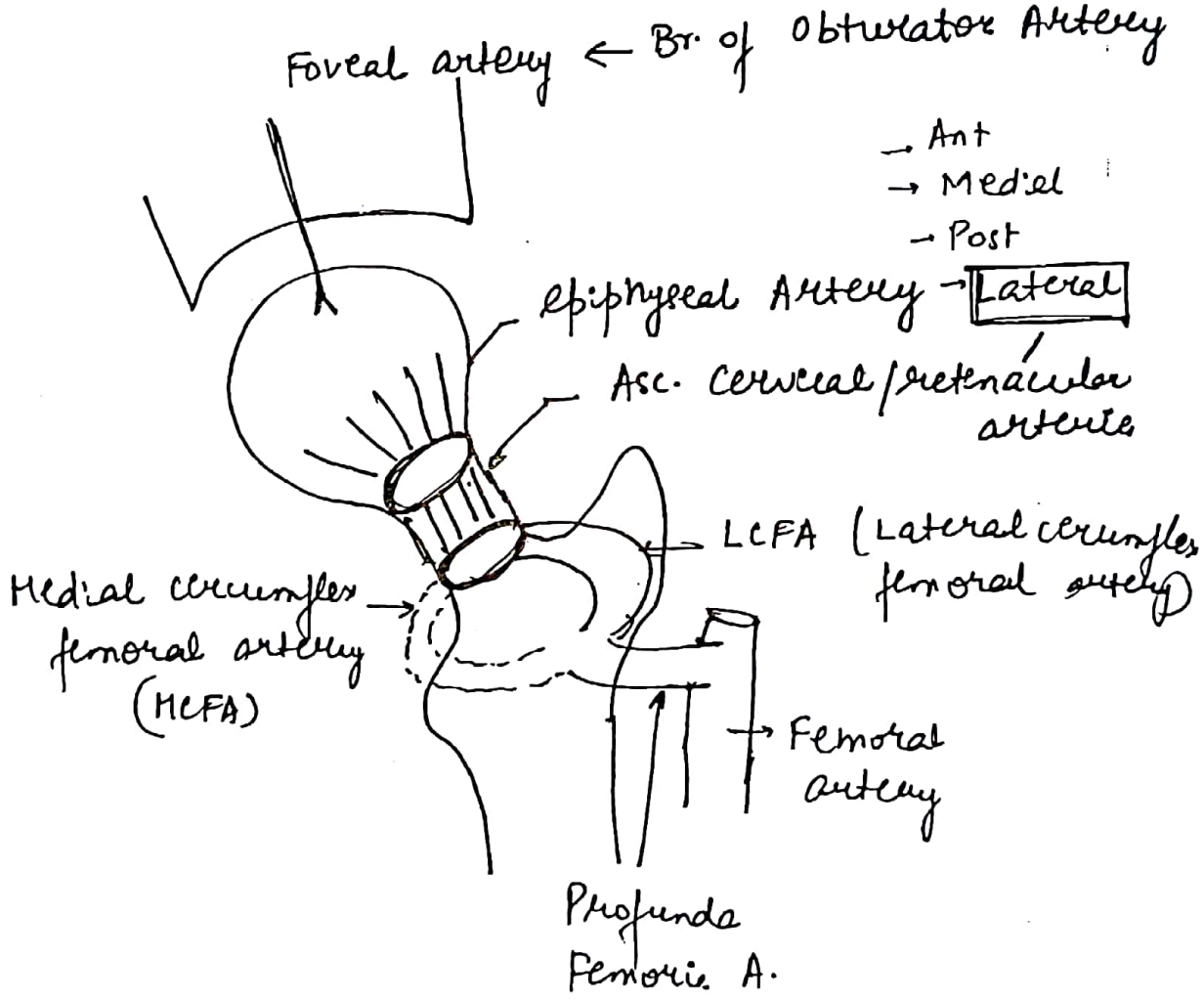
OBER'S T.– Iliotibial band contracture

SIMMOND THOMPSON T– Tendoachilis tear
Tendinctis /tear

## HIP JOINT

### ANATOMY

**BLOOD SUPPLY** Retrograde (distal → proxima)



| LURCH | | LIMP |
|---|---|---|
| Painless | | Painful |
| Diseased side ← | Trunk Deviate towards | → (N) side |
| Developmental Dysplasia of Hip | eg. | Septic arthritis |
| Poliomyelitis | | Transient Synovitis Hip. |
| Sup. Gluteal N/v Palsy | | |
| U/L Trendelenberg's/ Abductor/ Lurching gait | | U/L Antalgic/ Limping Gait |
| B/L Duck Waddling Gait | | B/L Not applicable |

## LIST 15 RADIOLOGICAL ANATOMY OF HIP

1) SHENTON'S ARC
Connects Inf. margin of sup. pubic ramus to medial aspect of Head & Neck of femur
Arc is interrupted/ broken in supratrochanteric pathologies.
eg. DDH

2) HILGENREINER'S LINE
Horizontal line connecting the centres of two acetabula

3) PERKIN'S LINE
Vertical line from superior acetabular margin I^r to Hilgenreiner's Line

4) PERKIN'S QUADRANTS

Intersection of above two Lines.

(N) Location of Head of femur < Inner / Lower

DDH < upper / outer

5) KLEIN'S LINE

Line along superior surface of Neck of femur
& (N)ly intersects Head of femur But in SCFE (slipped capital femoral epiphysis), it doesn't intersect head of femur

↓

POSITIVE TRETHOWAN'S SIGN

(frog leg Lateral view)

## PAEDIATRIC HIP DISORDER

### (A) DEVELOPMENTAL DYSPLASIA OF HIP

Def$^{n}$:- Idiopathic spontaneous subluxation / dislocation of Head of femur from Acetabulum.

**Before Birth**

Oligohydramnios

Packaging Disorder

IUPD
- Congenital Muscular Torticollis
- Metatarsus adductus
- Congenital knee dislocation

High Relaxin (H)

**At Birth**

Malpresentation

M/c association
Breech delivery ± extended knees/legs (10 times)

**After Birth**

Post Natal ☠ Theory

If u carry baby ± hips/knees extended
↓
D.D.H

STATISTICS:

Incidence = 1/1000 live births

Western > Asians

♂ : ♀ = 1:7 (♀ >> ♂)

B/L = 20%

Amongst U/L case - Left > Right

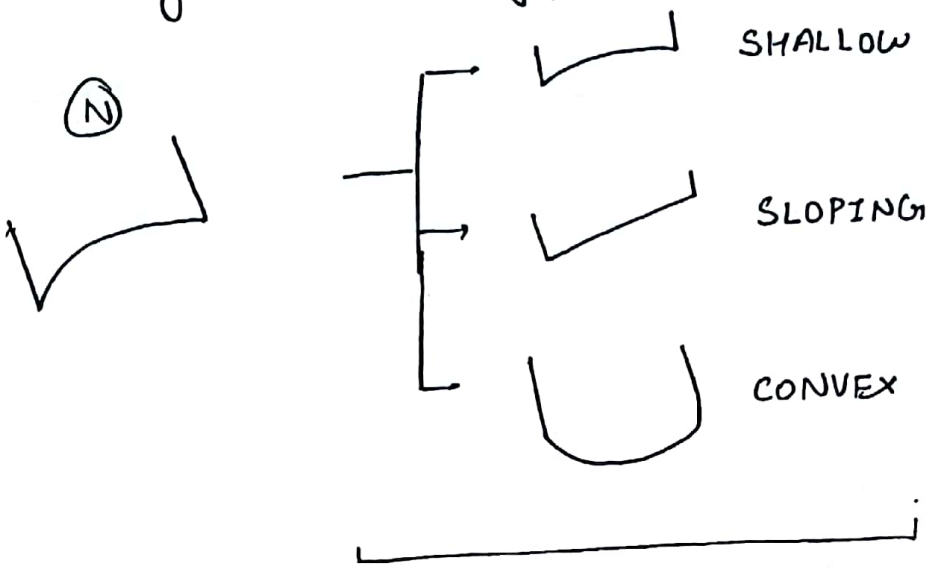
Overall sequence = Left > B/L > Rt

Five 7s
- ♀ child
- 1st born ♀ of family
- Fair complexion (white/western)
- Family History
- Faulty Intrauterine Position

M/c cause - Idiopathic

M/c association - Breech delivery ± extended knees + legs

Pathogenesis :- Dysplastic Acetabulum




upward + Lateral subluxation of / dislocation of Head of femur

↓

SHORTENING

* Hypertrophied, Inverted, infolded, Acetabular Lesion Labrum (fibrocartilage) (Inverted Limbus Sign)

* Hypertrophied fibrofatty tissue (PULVINAR) fills up empty acetabulum

* Hypertrophied ligamentum teres + Transverse Acetabular ligament

* HOURGLASS CONSTRICTION OF CAPSULE

Clinical Presentation :-

Risk factor Identification

↓

Asymmetrical skin crease < Thigh / Gluteal folds

↓

Wide perineum

↓

ORTOLANI's Test : Dislocated Hip } Age < 3months

↓

BARLOW's Test : Dislocatable Hip }

↓

ALLIS SIGN/ GALEAZZI's Test : Shortening

↓

Walking age group > U/L – Trendelenberg/ Abductor/ Lurching Gait

B/L – Duck waddling Gait

Δ :-

X Ray

Broken Shenton Line

Upper outer Perken's Quadrant

USG

IOC for screening of DDH

American Academy of Pediatrics

↓

Routine USG screening for DDH at 4-6 wks in ♀ infants > ⊕ family history, Breech delivery

GRAF's classification

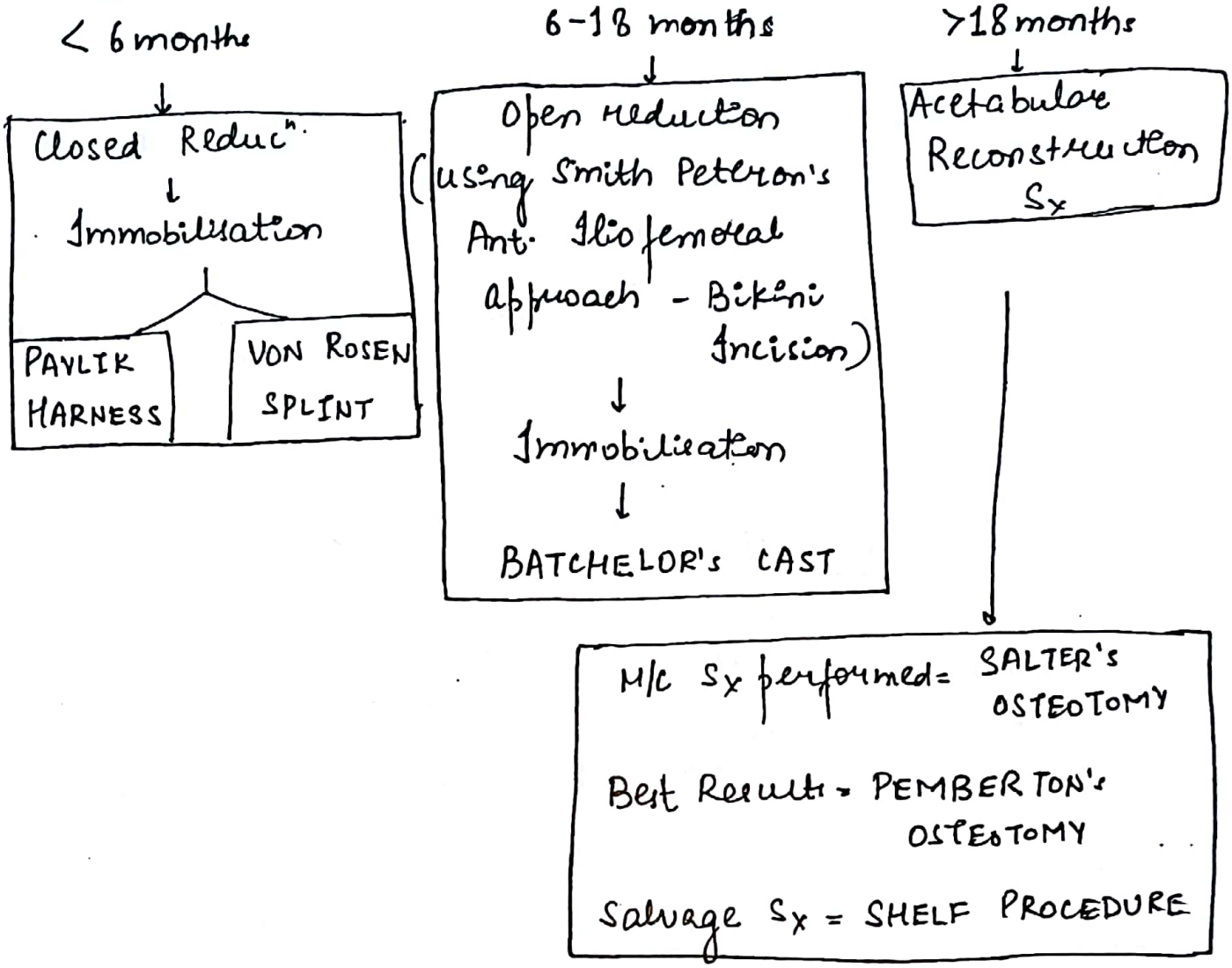
MRI

IOC for Δ of DDH

overall age ≤ >6mnth

Kashiwage classification

## Age Wise Mx :-




## (B) SLIPPED CAPITAL FEMORAL EPIPHYSIS

→ Minomer

→ Capital femoral epiphysis is well seated inside Acetabulum. It is the anterolateral disruption of Neck & gives apparent Posteromedial epiphyseal slip.

**STATISTICS:-**

Incidence = 1/2000

M/c cause = Idiopathic

M/c R/F = Obesity (↑ W/A)

M/c Association = Hypothyroidism

Other Association = Hypogonadism
GH excess
Craniopharyngioma

Age Group = ♂ = 13-17 yrs
♀ = 11-14 yrs

♂ : ♀ = 2:1

B/L = 30-35%

**PATHOGENESIS:-**

GH TT → Prox. femoral physis (Head) ← Hypogonadism

↓

Hypertrophied + Immature physis

↓

M/c ppt factor → PUBERTY ← GH surge

↓

Anterolateral disruption of PHYSIS

↓

Apparent posteromedial epiphyseal slip

**CLINICAL SPECTRUM**:- SHORT/ FAT/ Sexually immature
13-17yrs.

c/c- Limping/ Antalgic Gait
OUT-TOEING GAIT

→ Obligatory ER @ Hip during Hip Flexion
[DRENNAN's SIGN].

→ Child sits in W posture

→ Restricted Abduc" & IR

**DIAGNOSIS**:-

| X-RAY | CT | MRI |
|---|---|---|
| TRETHOWAN's SIGN | Acute/chronic slip | Ioc for Δ |

**Mx**

- Mild <33% → CR in situ pinning
- Moderate 33-50% → CR in situ pinning
- Severe >50% → OR + in situ pinning
  ↓
  prevents further recurrence

Sx is always done B/L as otherwise length discrepancy occurs.

(c) PERTHE'S DISEASE / LEGG CALVE
Germany USA France

COXA PLANA / OSTEOCHONDRITIS OF FEMORAL HEAD

**Defn** :- Idiopathic spontaneous osteonecrosis of Head of femur mainly due to blockade of venous outflow

↓

thick & distended veins

↓

arterial compression

↓

Ischaemia

↓

OSTEONECROSIS

**STATISTICS** :

Incidence = 1/10,000

♂ : ♀ = 5:1 ♂ >> ♀

Age Group = 4-9 yrs

B/L = 10-12%

H/c association = Protein C & S Deficiency
(factor V Leiden mutation)

Other associations - sickle cell anaemia
Passive smoking
Trauma
Mutation in Type II collagen

## PATHOLOGY — WALDENSTROM CLASSIFICATION / STAGING

I) Ischaemia

II) Revascularisation + Repair ⇒ fragmentation of Head

III) Reossification → flat head (Coxa plana)
- Mushroom head (Coxa Magna)
- Small head (Coxa Brevis)

IV) Healed : Residual deficit

## CLINICAL SPECTRUM

- 4-9 yr old child
- Ist clinical symptom = Limping / Antalgic Gait
- Pain in Hip → Groin, Knee, Thigh (Referred Pain)
- Limitation of Abduc" + IR @ Hip
- Obligatory **ER** while hip is flexed **CATTERALL SIGN**

## DIAGNOSIS

X-RAY :- 1) GAZE SIGN - Ⓥ/Ⓤ shaped translucency in lateral portion of head

2) SAGGING ROPE SIGN - Horizontal Radio-opaque line in upper femoral metaphysis

**IOC**:- MRI > Bone scan

**D/D** TB of Hip

→ early acetabular involvement → **TB**

→ Late " . → **PERTHE`s Ds**

**Mx** of Perthe's Disease

self Limiting Condition.

AVASCULAR PHASE- Non- weight Bearing
Bed Rest (offload Hip)
Abduction Braces for containment of hip.
Skin traction to maintain joint space to relieve pain/ spasm.

REPAIR/HEALED PHASE:. Sx
CATERALL AT RISK SIGNS (X-Ray)
(head at risk)

Gaze sign
Metaphyseal cyst
Lateral calcification
" subluxation of Head
Horizontal Lying physis.

CAFFEY's SIGN:- Loss of sphericity of femoral Head i subchondral # line mainly in weight bearing antero lateral part of femoral head.

## LIST - 15 NAMED SURGERIES

1) French Osteotomy (modified): Cubitus varus deformity (malunited supra condylar humerus)

2) Milch Osteotomy - Cubitus Valgus deformity (Non union Lateral Condyle Humerus)

3) Maxpage operation - Volkman's Ischaemic Contracture (moderate)

4) Bankart's operation - Anterior shoulder instability due to Bankart Lesion

5) Putti - Plat operation - Ant. shoulder instability due to Hill Sach's lesion

6) Bristow - Latarjet operation - " >>

7) Steindler's Release - Plantar Fascia Release for Pes Cavus (High Arched foot)

8) Fernandez osteotomy - Malunited ⊛ Colles #.

9) Varus derotation Osteotomy = Perthe's disease

10) Girdle stone Arthroplasty = T.B. hip

11) Core Decompression = Non Traumatic AVN femoral Head

12) McMurrey's Osteotomy = Non union # neck femur

13) Pauwel's Osteotomy = Non-union # neck femur

14) Lambrinudi Arthrodesis - Fixed equinus deformity at foot

15) Grice Green Procedure (Subtalar arthrodesis) (PID)
Congenital vertical Talus.
↳ Rocker bottom foot

16) Keller's operation (Excision arthroplasty) = Hallux valgus

17) Mitchell's / chevron Osteotomy = Hallux valgus **

18) Anterolateral Decompression = TB spine
(M/C surgery)

19) Hong Kong Procedure (Radical Anterior Decompression & Bone grafting)
TB cervical spine

20) Smith Peterson osteotomy = Ankylosing spondylitis

# INFECTION



## (A) OSTEOMYELITIS

Term OM was coined by NELATON.

**ETIOLOGY** LIST- 16

M/C cause of OM

Overall = S. Aureus

Acute OM / chronic OM / developing nation / developed nation / HIV / AIDS / Diabetic / open # / post-Sx / Immunocompromised disease ⇒ S. Aureus

Sickle cell Disease = Salmonella (Diaphysis)

I.V. Drug Abuser = Pseudomonas

Animal Bite = Pasteurella

Human Bite = Eikenella

Diabetic foot ulcer = Staph aureus

**PATHOGENESIS** :-

M/C route = Haematogeneous (blood stream)

↓

Skeleton

Axial < Appendicular

↓

Femur > Tibia

Prox < Distal (metaphysis)

M/c Bone Involved in OM

overall → Metaphysis of distal femur

Infants/children → ,,

Adults → vertebral Body

## WALDVOGEL CLASSIFICATION

Based on duration of symptoms

| Acute OM | Subacute OM | Chronic OM |
|---|---|---|
| <2 wk | 2-4 wk | >4 wk |

Immunity * < Virulence

ACUTE OM —(M/c complication of Acute OM)→ CHRONIC OM

Path. Hallmark

ABCESS

Staph aureus

pus

Necrotic bone debris

Path. Hallmark

SEQUESTRUM

* dead, Radiodense, Ischaemic, Necrotic, non-viable piece of Bone
* separate ~~bone~~ from underlying viable healthy parent bone
* surrounded by reactive, immature, subperiosteal, new bone INVOLUCRUM
* Two surface [Rough, Smooth]
* Never Bleeds
* ↓ Microscope = No haversian canal
* floats in pus, sinks in $H_2O$

## LIST- 17 TYPES OF SEQUESTRUM

Tubular = Pyogenic OM

Ring = Amputation stump, around insertion site of Steinmann's pin

Conical/ Annular = Amputation stump

Ivory = Syphilis

Feathery = TB( intra cavitatory) > syphilis

Sand = Fine sand viral OM

Coarse sand TB ( extra cavitatory)

★ Rice Grain = TB

Black/ Coke = Actenomyces/ fungal OM

Coralliform = Perthes Disease

Kissing = Paradiscal TB. spine

Bombay = $H_2S$ inhalation.

**Mx of Acute OM :-**

young child

Rural background

RUBOR
DOLOR
CALOR
TUMOR
Functio Laesa

× 48-72 hrs

Knee

(I) Blood Counts

CBC/ ESR/ CRP

TLC↑ N↑ ESR↑

CRP ⊕

(II) Blood culture

⊕ in 50% of pts

Gram staining — Antibiogram.

>48-72 hrs.

S. procalcitonin Level ⇒ >0.4 ng/mL.

↓

Sensitive/Specific marker for OM

(III)
- Pain Relief (NSAIDs)
- Rest
- Immobilisation (splint)
- Cold Packs
- Elevation

Broad spectrum I.V. Antibiotics (empirical therapy)

(IV) X-RAYS

1st/earliest X ray Sign = Soft tissue shadow/ Lucency ∵ in 48 hours.

2nd X-Ray Sign = Periosteal Reac$^n$ (Classical) (new bone formation 7-10 days)

(V) MRI

IOC for Dx of Acute OM

≤24 hrs = marrow oedema

(VI) $Indium_{111}$ labelled Leucocyte scan/ Gallium-67 scan/ $Technetium_{99m}$ HDP Scan

## Mx of CHRONIC OM

pt → Clinical Hallmark = SINUS
pt → Pathological " = SEQUESTRUM

Rx = 1) Sinogram
2) Sinus Tract Exploration
3) sequestrectomy
4) Saucerisation
5) Curettage
6) Bone Grafting
Antibiotic laden Bone Cement Bead.

Punctate bleeding spots during curettage intra-operatively
↓
PAPRIKA SIGN
(DNB June, 2017)
good outcome

7) Debridement
8) Sinus Tract Excision
→ To prevent Recurrence
→ to prevent Sq cell carcinoma of Tract (delayed/ rare complication)

→ pre-op / intra-op / post-op Antibiotics. (I/v or oral)

**Post-op** → drain
Skin Traction
I.V. Antibiotic x6 week
oral Antibiotic x6 week

# VARIANTS OF OM

## BRODIE's ABCESS

Subacute OM

Tibia

M/c Bone

Microbe gets entrapped in fibrous tissue proliferation

Immunity > Virulence

## GARRES SCLEROSING OM

Long standing chronic OM

Mandible > Tibia

Causes periosteal rxn. by an extremely sensitive periosteum in response to low grade anaerobe

(+) ← Pus → (+)(−)

Pain deep dull aching

swelling (+)

(+)(−)

Sinus
Sequestrum

(−)

Curettage +
Bone Grafting +
Antibiotic cover

Mx

Antibiotics +
NSAIDS

ADULTS

CHILDREN

# SEPTIC ARTHRITIS

Surgical Emergency

ETIOLOGY:- M/C cause of Septic Arthritis

overall → Staphylococcus Aureus

Sexually Active Age Group = Gonococcus

PATHOGENESIS:-

S. Aureus

M/C Route - Hematogenous

↓

M/C Joint → KNEE > HIP

S: Aureus

↓

proteolytic enzymes (degradative)

collagenase

elastase

Aggreconase

Gelatenase

Matrix Metalloproteinase (MMP)

↓

destroy Articular cartilage

in 2-8hrs

↓

once degenerated never regeneration

↓

pathological fusion of joint

↓

End result:- BONY ANKYLOSIS

Articular

Avascular

Aneural

Alymphatic

devoid of perichondrium

Type II collagen

Clinical Spectrum:-

Child

Rural background

| | |
|---|---|
| Rubor | Acute onset |
| Dolor | Severity ↑↑ |
| Calor | critically ill |
| Tumor | Septicaemia |
| Functio Laesa | Shock / Rigor |

Earliest / 1st symptom = PAIN

Antalgic / Limping Pain

ROM. can't / shouldn't be checked

Attitude of deformity — Flexion / Abduction / ER

FABER

(most comfortable position of Hip Capsular volume is maximum)

**Mx**:

(I) Blood Counts

CBC / ESR / CRP

TLC ↑↑ N ↑↑ ESR ↑↑ CRP (+)

(II) USG Guided Aspiration (NEXT STEP)

for therapeutic purpose

(not for Acute purpose)

(III) Arthrotomy (Best step)

Surgical irrigation + debridement of joint

- via wide incision + exposure
- Thorough lavage
- post-op I/V Antibiotic + drain + skin Traction

## GONOCOCCAL SEPTIC ARTHRITIS

M/C - Knee
Not surgical emergency
Responds to Penicillin / Cephalosporin.

## TOM SMITH ARTHRITIS (NEET 2018 - Epiphyseal cartilage)

septic arthritis of infancy
M/C - HIP
spread mainly due to umbilical sepsis
Since head is entirely cartilagenous, it gets completely absorbed. ⇒ poor outcome

**TB:-** M/C cause of monoarthritis in children ★

## LIST-1B BASIC TERMINOLOGY

1) Arthroplasty - Surgical Joint Replacement
2) Arthrodesis - " " fusion.
3) Arthroscopy - Minimally Invasive Surgery
   (B) Diagnostic + therapeutic

4) Arthrotomy - Surgical I & D of Joint via wide excision

5) Arthrocentesis - Surgical aspiration of Joint

| SACH FOOT | JAIPUR FOOT |
|---|---|
| Solid Ankle Cushioned Heel | Base of LL. Prosthesis |
| Base of LL prosthesis | |
| 40,000 - 50,000 INSD. | 40,-50 INSD |
| Expensive raw material | Cheap material (Hair) |
| Not Cosmetic | COSMETIC |
| NO Barefoot walking | Barefoot walking possible |
| Compulsory shoe wear. | Shoe wear optional |
| Squatting not possible | Squatting possible |
| SOLID KEEL ⇕ Metal / Wood | Flexible keel (Rubber) |
| Plantar/Dorsiflexion not possible | Plantar/Dorsiflexion possible |
| Inversion/Eversion not possible | Inversion/Eversion possible |
| Irregular surface walking not possible | Irregular surface walking possible |

SAFE FOOT → Solid Ankle Flexible Endoskeletal foot

# AMPUTATION PROTOCOLS

1) Longer post flap
Smaller Ant. flap.
So that suture Line lies anterior to midline in coronal plane

2) **MYODESIS**
Should be done in children ← Trauma / Tumour

3) Avoided in I infection / ischaemia

3) **NERVES**
↳ double ligated & gentle traction is applied. & cut in single shot to allow prox. cut end to retract as max. as possible to avoid Post Amputation NEUROMA

4) **A/K Amputation**: Musculotendinous junc" of Quad. Femoris.

5) **B/K Amputation** = Musculotendinous Junc' of Gastrocnemius

# KNEE JOINT

## LIGAMENTS OF KNEE

* MENISCI
  Cushions / shock absorber

### MEDIAL MENISCUS

C-shaped
more elliptical
Wider than LM
peripherally attached to MCL
Less mobile
Can't escape twisting injury
More injured

VALGUS Injury (more common)

### LATERAL MENISCUS

Semicircular shape
free from L.C.L
(LM) (Popliteus) (LCL)
↓
Intra-articular tendon.
More mobile
can escape twisting Injury
Less injured.

VARUS Injury (Less common)

**MODE OF INJURY**

**Clinical Tests**

Apley's Grinding Test
Mc Murray's Test

**Mx**

**CLINICAL TESTS**

- IOC: MRI
- Gold Std Ix: Most Reliable Ix: ARTHROSCOPY

Prone - Apley's
Supine - Thompson's
ER + flexion
IR + flex

supine
↓
(L) hand - medial jt.
(R) Grab distal end of leg

Med. collateral lig damage ↓
excessive valgus can be done
↓
undue opening of medial Jt. space
↓
VALGUS STRESS test
(+ve)

### Ant. Drawer Test

Supine → knee flexed 90°
hold tibia ↓
fingers on post part
↓
extend (ant. draw)
↓
Pain excessive

Lachman - 30° flexion + ant. drawer test

### Pivot shift test

valgus + IR + flex
↓
tibia pops out

$R_x$ = Authroscopic Partial meniscectomy

* Menisci move ↑ knee movements.
  They move forward → Knee extension
  They " backward → " flexion.

* Mc ligament to degenerate = Medial Meniscus

* Post Partial Meniscectomy
  LM degenerate > MM remnants

* M/c Meniscal Tear:-
  Overall = M.M
  ↑ Acute ACL tear = L.M.
  ↑ Chronic ACL " = M.M

## COLLATERALS

Coronal plane stability

| M.C.L. | | L.C.L |
|---|---|---|
| attached to M.M | | free from L.M. |
| More fixed | | less fixed |
| Less mobile | | more mobile |
| Can't escape | Twisting Injury | escapes |
| More injured | | Less injured |

VALGUS Injury — **Mech. of Injury** — VARUS Injury

VALGUS STRESS test — **Clinical Tests** — VARUS STRESS Test

**Mx**

If clinical Test ⊕

Ioc
MRI

Rx

Isolated collateral ligaments are best managed conservatively (Rest/ cold pack/ Elevation/ Knee Brace)

M/c Ligament to injured = M.C.L.

## CRUCIATES

Sagittal plane stability

A.C.L.

Intracapsular
Intraarticular
Extrasynovial

P.C.L

Intracapsular
Intraarticular
Extrasynovial

1.5 time broader
better visualised on MRI

ACL prevents excess ant. translation of tibia over femur

PCL prevents excess post-sagging of tibia over femur

Downhill/ Downstair — Uphill/upstair

Mid substance — M/c site of tear — Femoral attachment

Hyperextension injury > MOI > Hyperflexion injury

## Clinical Tests

ANT. DRAWER's TEST (Knee 90° flexion) — POST. DRAWER's TEST

LACHMANN's TEST
Best for ACL acute. (Knee 30° flexion)

PIVOT SHIFT TEST
Most Specific Test/ Gold std. test for ACL

Mx

If clinical Test (+)

IOC
MRI

Gold Std. Ix
Most Reliable Ix
Arthroscopy

Rx = ARTHROSCOPIC ACL/ PCL RECONSTRUCTION
(M/c Donor tendon Graft = Semitendinosus + Gracilis

ACL ← middle Genicular artery (Br. of popliteal A)

PCL ← post. articular artery (Br. of Tibial N).

M/c common surgically operated leg (knee) = ACL

M/c cause of Haemarthrosis = ACL

**ACL**

AIIMS **

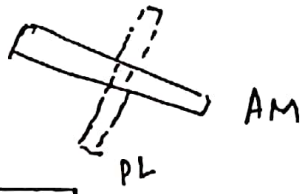
**ANTEROMEDIAL**

taut in Knee 90° flexion

**POSTEROLATERAL**

taut in complete knee extension

**Knee 90° flexion.**




**Knee complete extension**


Most pain sensitive structure in joint = capsule

Least " " " " = Articular cartilage

Meniscal Cyst :-

appear as swelling along post. joint line & disappear in jt on knee flexion. (PISANI SIGN)

Meniscal Tear — MM > LM.

Meniscal Cyst / Discoid Meniscus — LM > MM

* LOCKING OF KNEE

Medial rotation of femur over tibia

Knee extension

Standing posture

UNLOCKING OF KNEE

Lateral rotation of femur over tibia

Knee flexion

Sitting posture

Popliteus

* Portals in Arthroscopy :-

Superolateral = patellofemoral Jt visualization

Anterolateral = VISION

Anteromedial = Instrumentation.

ACL / PCL Tear = ♀ athlete > ♂ athlete

↓

Narrow intercondylar notch

Hormonal influence

Leg. Laxity ↑

IOC

- Knee leg injury = MRI [Gold Std Ix Asopy]
- Knee Cartilage injury = Arthroscopy

Multiligament knee injury
Injury to atleast 2 out of 4 (except meniscus)

## PLICA SYNDROME

Embryonal remnants of synovium

4 types
- MEDIAL
- LATERAL
- SUPRAPATELLAR
- INFRAPATELLAR

C/F :-
→ Ant. Knee Pain
↳ exaggerated on prolonged sitting
→ Locking / catching symptoms

Association - Chondromalacia patellae

Comp^ - Meniscal tear.

IOC - MRI

Gold Std. Ix = A' scopy

Rx = A' scopic plica excision

# ONCOLOGY

## LIST - 19 MOST COMMON

M/c BONE TUMOUR = Metastasis / 2°

M/c Malignant B.T. = Metastasis / 2°

M/c 1° Malignant B.T. = Multiple Myeloma > osteosarcoma

M/c Benign B.T. - osteochondroma / exostosis

M/c TRUE Benign B.T. = Osteoid osteoma

M/c 1° malignant B.T. =
- ↳ Of 1st decade of life - Ewing's Sarcoma
- ↳ of chest wall = chondrosarcoma

M/c Radiation induced BT = Osteosarcoma

Most Radiosensitant BT = ,,

M/c ~~Benign~~ Bone Tumour of Hand Bone = Enchondroma

M/c Benign B.T. of Hand bones = ,,

M/c 1° malignant BT. of Hand Bone = Chondrosarcoma

M/c malignant Tumour of Hand = SCC

LIST-20

## CHONDROBLASTOMA / CODMAN'S TUMOUR

→ Benign Tx  case:- (Dost ka nephew)

→ Age < 18yrs.
↳ skeletally immature pts

- centric
- epiphyseal
- expansile — slightly symmetrically

→ Long standing Pain + swelling. (↑ on exertion)

- Mimics Synovitis.

- X-Ray :- well circumscribed
  Regular margins
  Epiphyseal Lesion.
  Stippled calcification.

BIOPSY :- chicken wire calcification.

Mx :- Extended Curettage + Bone Graft/Bone cement

## GIANT CELL TUMOUR / OSTEOCLASTOMA

Locally aggresive

5-15% GCTs are malignant

♀ > ♂

M/c Bone = Distal femur epiphysis

U.C.T - ⇒ spine (vertebral Body)

4 E :- Eccentric
Epiphyseal
Expansile → Gross
asymmetrical.
Egg shell crackling

Age Group :- 20-40 yrs (skeletally mature pt.)

X-RAY - (G)eographical destruc"
Soap Bubble appearance

Mx Wide excision ± customised prosthetic
allograft Reconstruc".

MICROSCOPY = GCT ⇒ Giant cell (40-60 nuclei)

## GIANT CELL VARIANTS ★★★★★★

(A) neurysmal Bone Cyst (closest)
(B) rown's Tumour
(C) hondroblastoma
(D) esmoblastic fibroma
(E) pulis / Giant Cell Rich Granuloma
(F) ibroma of non-ossifying type (M/c variant)
(G) Giant cell Rich osteosarcoma
(H) istiocytoma

# ANEURYSMAL BONE CYST

Locally aggressive B.T

♀ > ♂

M/C site - Metaphysis of Prox. Femur

ABC → spine (post. column)

Age Group - 10-18 yrs

Expansile < Grossly (More pulsatile)
Asymmetrical
Bruit ⊕ on auscultation.

Eccentric

X-RAY multiple blood filled sinusoids
& well defined septate in between

Closest Giant cell variant

Rx Wide excision + Allograft Reconstruction.

## OSTEOSARCOMA

Highly highly malignant B.T.

M/C 1° malignant B.T. of non hematopoietic origin.

M/C Radiation induced B.T.

Most Radioresistant Bone Tumour

| TYPES | 1° | 2° |
|---|---|---|
| | 75% | 25% |
| | 2nd Decade | 5th/6th decade |
| | de novo | pre. malignant lesion |

M/c - Paget's Ds of Bone (< 1%)
Post Radiation
Chr. OM
p53 mutation
Hereditary survive of Retinoblastoma

M/c Bone : Distal femur (metaphysis)
M/c site of 2° from osteosarcoma - Lung (via blood stream)

Bone to Bone metastasis

X-RAY 2P's → Periosteal Rxn (Sunray / Sun Burst Appearance) along sharpey's fibres
→ Periosteal Elevation (Codman's Δ)

Mx = Neoadjuvent Rx

Pre-op chemo → Radical excision (~10cm) → Megaprosthesis (arthroplasty) → Post-op chemotherapy

↓ size, vascularity, metastatic pot"

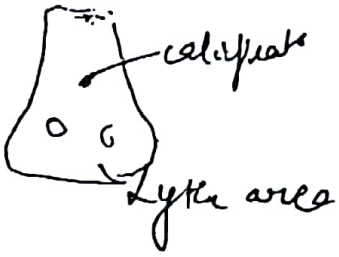
T10 Protocol (Rosenberg Protocol)

High Dose Methotrexate
(cisplatin → substitute)
Bleomycin
Cyclophosphamide / Ifosfamide
Doxorubicin

Actinomycin
Vincristine

## ENCHONDROMA

M/c Benign Bone Tx of Hand Bones
M/c Bone Tx of Hand Bones.
Age Group - (4th - 6th Decade)
♂ > ♀
M/c site :- Hand > Foot
Phalanges > Metacarpal



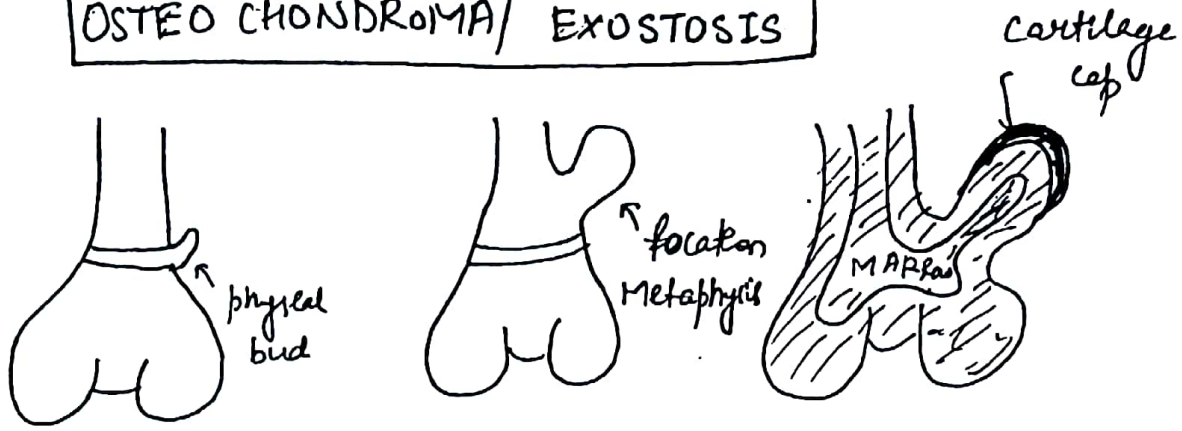

**X-RAY** well defined lytic lesion with wisps of calcification (Stippled Calcification)

Usually Solitary
Rarely Multiple

OLLIER
multiple enchondromatosis

MAFFUCI
multiple enchondromatosis
+ Phlebolith +
Cavernous Hemangiomas.

# OSTEO CHONDROMA/ EXOSTOSIS




M/C Benign B.T.

Not true B.T.

♂ > ♀

M/c site = Metaphysis ( Distal Femur)

Age Group = 4-12 yrs

Usually regresses before skeletal maturity

Type

- Sessile ← i.e. out stalk
- Pedunculated → i.e. stalk.

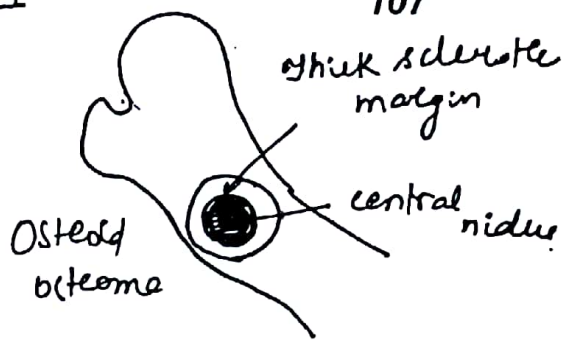
Type

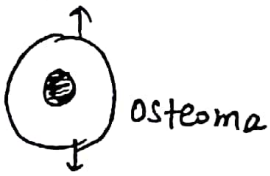
- Solitary → Malignant Potential
- Multiple >
  - MASADA SYNDROME → multiple osteo chondromatosis of forearm
  - HME → Hereditary multiple exostosis

Mx = Surgical excision in toto if symptomatic.

# OSTEOID OSTEOMA






| OSTEOID OSTEOMA | | OSTEOBLASTOMA |
|---|---|---|
| M/c True Benign B.T. | | Rare B.T. (aggressive than O.O.) |
| 2nd/3rd decade | | 2nd/3rd decade |
| ♂ > ♀ | | ♂ > ♀ |
| FEMUR | M/c Bone | SPINE (Post. column) |
| O.O. → spine (post. column) | | |
| Peripheral thick. Reactive Sclerotic Rim   | Structure | Radiolucent Peripheral Rim  |
| Central Radiolucent PG↑↑↑↑ Rich nidus | | Central sclerotic PG↑↑ Rich nidus. |
| OSTEOID | | |
| dia < 2cm | | dia > 2cm. |
| ↑↑ ↑↑ | Night Pain | ↑↑ |
| 90% | Aspirin Relief | 40-50% |
| Low Dose Aspirin Radiofrequency Ablation Curettage of nidus | Mx | Marginal excision ± Bone grafting / Bone Cement |

# EWING'S SARCOMA

5-15 yr ♂

Pain, Swelling ] @ Thigh  M/c site = Femur (dia)

CBC TLC ↑↑ NT
ESR
CRP ESR ↑ CRP ⊕ ] Mimics = Osteomyelitis

NSAIDS/ Antibiotics → Temporary Relief

X-Ray - Laminated/ Lamellated Periosteal Reaction (Onion peel appearance)

IOC: MRI

Best = Biopsy

Histopathological
Small round cells ⊕
PAS ⊕
diastase sensitive

Immunohistochemistry
MIC-2 ⊕
CD 99 ⊕
CD 57 ⊕
NSE ⊕
S-100 ⊕

Karyotyping
t(11;22)
Most Asia
t (7;22) ⊕

Bone to Bone Metastasis - Ewing's sarcoma > osteo sarcoma

Most Chemo/Radiosensitive

Mx :- E.C.R.T. (extra Corporeal RadioTherapy) +
- Internal fixation

## LIST-20 ONE LINERS (METASTASIS)

1) Bony 2° ♂ → Ca prostate > lung
♀ → Ca Breast > lung
child → Neuroblastoma
overall sequence - Breast > prostate > lung
B PL

2) Bony 2° → Blastic - Prostate + Seminoma
→ Lytic - Ca kidney + Ca thyroid + Ca lung
→ Mixed - Ca Breast

IOC for Occult → Blastic 2° = Bone scan
Lytic 2° = Pet-CT

Pulsatile Bony 2° → Follicular Ca thyroid
→ Renal cell Ca.

M/c Site of 2° from Ca Breast = Thoracic Spine

M/c Cause of path # → Osteoporosis > Bone 2°

M/c Site of path # → overall - Vertebral Body, $T_{12}$
→ due to Osteoporosis → ,,
→ due to Bone 2° → Neck of femur

# MIREL'S SCORE

Calculates Risk of Impending Pathological # in Bony 2°

| Parameters | ① | ② | ③ |
|---|---|---|---|
| Size of Lesion | $<1/3^{rd}$ | $1/3 - 2/3$ | $>2/3$ |
| Site of Lesion | UL | LL | around hip |
| Nature of Lesion | Blastic | Mixed | Lytic |
| Pain due to Lesion | Mild | Mod. | Severe |

Total $\geq 8$ ⇒ High Risk of path #

Mx = prophylactic Int. fixation.

# TB

## POTT'S SPINE

ETIOLOGY - Mycobacterium TB

[Pulmonary TB - $10^7 - 10^9$ bacillary load]

Skeletal TB = $10^5$ bacillary load

(Paucibacillary)

PATHOGENESIS

M/c Route - Haematogenous

Site :- Lung > Lymphnode > G.U.T > **Skeleton**

4th M/c site of TB.

M/c site

- U.T.S.
- ↓
- L.T.S.
- ↓
- T.L.J^

**M/C SITE**

Spine > Hip > knee > Foot > elbow > Hand > shoulder

L/C SITE OF SKELETAL TB

Bursal TB (Amongst Bursa)

↓

M/c Bursitis

[Trochanteric Bursa]

L/C Site of TB in Bone/Joints

Mandible < TMJ.

## TYPES OF LESION :-

### I) PARADISCAL TB **

H/C Type

Arterial spread

1st part :- V. Body Adjacent to IV. Disc

Kissing Sequestrum.

H/C type / Lesion to complicate into POTT's PARAPLEGIA.

### II) CENTRAL

Venous Spread (interosseous venous plexus)

1st part = centre of V. Body

IV. Disc is usually preserved

Later stage :- Whole Body collapses 'CONCERTINA COLLAPSE'

↓

~~1st~~ Flat V. Body (vertebra Plana)

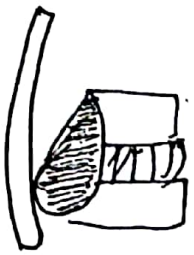
### III) ANTERIOR TB

spread ~~subperiosteal~~ subperiosteally beneath A.L.L

Children

Wet / exudative TB

ANEURYSMAL phenomenon (X-Ray)



## IV) POSTERIOR / APPENDICEAL TB.

LC type

LC site = Facet Joint

2nd LC site = Spinous Process

CLINICAL SPECTRUM :-

1st / earliest Symptom = Backpain

1st / earliest sign = Paraspenal M/s spasm

↓ R.O.M. @ spine

Cautious Gait

Military Attitude

Constitutional Features of TB (60% of cases)

COLD ABSCESS (tumour +)

No, Rubor / dolor / calor

└ Travel along NV Bundles + muscle sheathe

Deformity :- prominent spinous process due to kyphotic deformity

- Knuckle — 1 v. Body
- Angular Kyphus → 2/3 v. Bodies (Gibbus)
- Rounded Kyphus > 3 v. Bodies

DIAGNOSIS :-

⇒ X-RAY :-

1st X-Ray Sign → ↓ I.V. Disc Space
↓
V. Body destruction / erosions
↓
paravertebral soft tissue shadow
↓
BONY ANKYLOSIS

→ TB of any Bone / Joint ends up in FIBROUS ANKYLOSIS except SPINE (Bony Ankylosis)

→ TB of any Bone never shows periosteal reaction on X-RAY except Tubercular dactylitis / Spina ventosa

⇒ MRI :- IOC for pott's spine

⇒ CT guided Biopsy - Most Reliable / ~~Most~~ Gold Std for Dx

Mx :-

* Chemotherapy (main stay) → A.T.T
* Bed Rest
* TAYLOR'S SPINAL BRACE

Sx

1) Defaulter
2) Relapser
3) Resistance
4) Compression over vital str
5) Late presentation (advanced paraplegia)

## Sx

1> HONG KONG OPERATION — Ant. decompression TB cervical spine

2> ANTEROLATERAL DECOMPRESSION ī BONE GRAFTING

→ M/C Sx performed

→ DOTT & ALexander 1947

→ Dr. S.M. Tuli ⇒ Ⓡ Lateral position
Semicircular Incision

### Str. to be Removed :-

1) Transverse process
2) part of pedicle
3) v. Body (diseased)
4) post. part of rib
5) I.V. Disc (diseased)

### POTT'S PARAPLEGIA

M/C site = U.T.S.

| (I) | (II) | (III) | (IV) |
|---|---|---|---|
| Pt unaware of neuro deficit | Pt. aware of neuro deficit ī support ambulatory | Paraplegia in extension | Paraplegia in flexion |
| O/E: Ankle Clonus | Ⓝ sensory | Sensory Loss < 50% | Sensory loss > 50% |
| Spasticity | Motor Loss | sensory Loss | Sphincter Loss |

# PROGNOSTIC MARKERS / FACTORS :-

| | GOOD | BAD |
|---|---|---|
| Age | young | older |
| ONSET | Early | Late |
| DURATION | Shorter | Longer |
| PROGRESSION | Slow | Rapid |
| LESION TYPE | Wet / exudative | Dry |
| SEVERITY | Stage I / II | III / IV |
| GEN. CONDITION | Good | Poor |
| KYPHOTIC DEFORMITY | $<60^{\circ}$ | $>60^{\circ}$ |
| CORD STATUS IN MRI | (N) | Myelomalacic change |

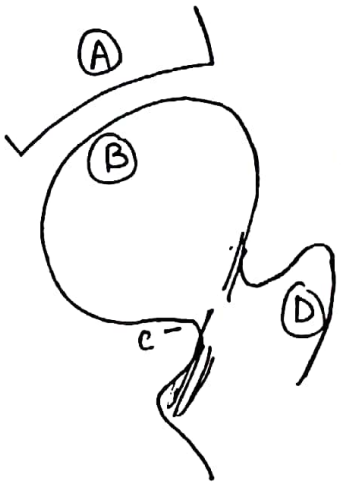
M/C cause of kyphosis in India = TB

# TB HIP

Spine TB > Hip TB (15% skeletal TB cases)

Focus of Appearance

- Acetabular roof (M/C) (A)
- Epiphysis of Head (B)
- Metaphysis (area of watershed between (C) femoral & obturator circulation = BABCOCK's Δ
- Greater Trochanter (D)




## STAGING OF TB HIP

(I) SYNOVITIS :-

Flexion + Abduction + ER (FABER)

Joint effusion + Capsular distension

X-RAY :- Widened Joint Space

(II) EARLY ARTHRITIS :-

Flexion + Adduction + IR (FADIR)

destruction of Articular Cartilage

True shortening < 1 cm

X-RAY :- Narrowing of Jt. Space

(III) ADVANCED ARTHRITIS / LATE

Flexion + Adduction + IR

further destruction of joint

True shortening >1cm

X-RAY- Complete Destruc° of Jt space/Head/Acetabulum

(IV) LATE ARTHRITIS ~ SUBLAXATION/ DISLOCATION

Flexion + ~~Abduction~~ Adduction + IR

Gross shortening

Upward & Lateral sublaxation/dislocation of Head

False Acetabulum Highere Up

(Wanderling acetabulum / Travelling Acetabulum)

MORTER & PASTLE Appearance

CLINICAL PICTURE:-

5-15 yr

M/c earliest Symptom = Painful Limp

Limping / Antalgic Gait

Muscle wasting

Shortening

Deformities

Constitutional features

Cold Abscess

Late Stage = Fibrous Ankylosis

X-RAY:- PHEMISTER 's TRIAD
Juxta articular osteopenia (1st X-Ray Sign)
periarticular erosions
↓ Jt. space

Mx = ACTIVE STAGE → A.T.
→ Skin Traction. , relieves spasm

If pt. doesn't respond to above
WILKINSON 's JOINT CLEARANCE Sx
(Debridement)

HEALED STAGE
Subtrochanteric osteotomy
Girdlestone excisional arthroplasty
Arthrodesis (surgical fusion of a joint) ⇒ M/c ly performed
↳ painless fixed stable Joint

Arthroplasty → painless mobile stable Joint
(THR)

# OSTEOARTHRITIS

Misnomer

Degenerative Joint Disorder [D.J.D.]

Non Inflammatory

~~Wear~~ ~~tear~~ wear tear joint Disorder/

R/F:- ♀ > ♂

Age > 65yrs

BMI > 30

Sedentary Life Style

Occupational Hazard

Previous Trauma

Joints:-

Knee

Hip

Spine

1st C.M.C. Jt.

1st M.T.P. Jt

PIP jt

DIP jt

M.C.P. Jt
Wrist
→ Rheumatoid arthritis

## OA Knee

M/c Bone = Patella

M/c compartment = Medical

M/c muscle = VMO
Vastus medialis obliquus.

## PATHOGENESIS

1st Layer = Articular Cartilage

OUTERBRIDGE STAGING

(I) - Articular Cartilage water content ↑↑ softening of articular cartilage

(II) fissures / cracks / fragmentation

(III) partial detachment

(IV) complete detachment ~ exposed subchondral Bone

## CLINICAL

60 + ♀

1st Earliest Symptom - Pain

Tenderness

Swelling

Crepitus

Deformity → Knee = Genu Varum

→ Bouchard's node - PIP Jt

→ Heberden's node - DIP Jt

↓ walking distance

## X-RAY :-

1st Earliest X Ray Sign = Asymmetric Reduction in jt space

↓

Osteophytes.

↓

Loose Bodies.

↓

↓

Subchondral Sclerosis

↓

Absolute destruc$^{n}$ of jt. space

**Mx** :-

CONSERVATIVE

1) Walking crutch/stick
   ↳ opposite hand

2) Hinged knee Braces
   ↳ offloading devices.

3) NSAIDS
   Safest → Acetaminophen.

4) COX-2 Inhibitors
   → Etoricoxibs (60/90/120/mg)
   → No GI S/E

5) Topical Liniments

6) Isometric Quadriceps strengthening exercise

7) Precautions

8) Intra-articular viscosupplementation
   ↳ Hyaluronic Acid derivatives
   ↳ Viscosity of synovial fluid

SURGICAL

1) **ARTHROSCOPY**
   Initial phase of disease
   * Remove inflamed tissue
   * Remove loose Body
   * Arthrolysis

2) TOTAL KNEE REPLACEMENT
   Absolute Indication
   ↳ Pain.

*** Glucosamine
Diacerein
Chondroitin sulfate
S-adenosyl methionine
(PLACEBO & EFFECT)
} ⇒ OA

# ADVANCED TRAUMA LIFE SUPPORT

POLYTRAUMA
Injury to ≥ 2 systems

TRIAGE

SEQUENCE OF 1° SURVEY (ATLS)

* Cervical Spine Control — Hard cervical collar
Philadelphia collar
log roll position

* Airway → suction
→ Endotracheal Intubation

* Breathing – Rule out :-
Tension Pneumothorax
Hemothorax
Flail chest

* Circulation – Hemodynamic parameters

Pulse ← BP → Urine output

Tachycardia + Hypotension + oliguria

Hypovolemic shock

Stop Bleeding > IV fluid / BT.

* massive catastrophic H'g
  ↳ circulation is a priority even before

* Disability
  GCS < Eye / Verbal / Motor

* Exposure
  to rule out occult Injurie

**TRAUMA AROUND HIP.** (A) # PELVIS

TILE'S CLASSIFICATION

| TYPE (A) | TYPE (B) | TYPE (C) |
|---|---|---|
| Horizontally + Vertically stable | Horizontally unstable + Vertically stable | Horizontally + Vertically unstable |
| (1) # not involving Ring<br>Avulsion #<br># Iliac crest | $B_1$ = open Book #<br>pubic symphysis diastasis / disruption | $C_1$ = U/L |
| (2) # of Ring (stable)<br>$M_X$, conservative | $B_2$ = Lateral compression ~ I/L pubic rami #<br>$B_3$ = Lateral compression ~ C/L pubic #<br>(Bucket Handle #) | $C_2$ = B/L<br>$C_3$ = ~ Acetabular # |

M/c presentation / complication ( Type C)

↓

Hypovolemic Shock

( Avg Blood Loss = 2 L

pelvic venous plexus

Hypotension + Tachycardia)

Mx of Type C

Immediate pelvic external fixator.

( to ↓ pelvic volume creates pelvic tamponade effect create. pelvic hemostasis.

## MOREL - LAVALLEE LESION

→ Post- traumatic closed degloving soft tissue injury in skin + subcutaneous tissue

→ Vessels + Lymphatics perforate + fill the potential space c blood, serosanguinous fluid + necrotic fat

→ Pt presents c enlarging painful mass in anterolateral thigh + close to greater Trochanter

Rx = Aspiration. + Tube Drainage

## (B) HIP DISLOCATION

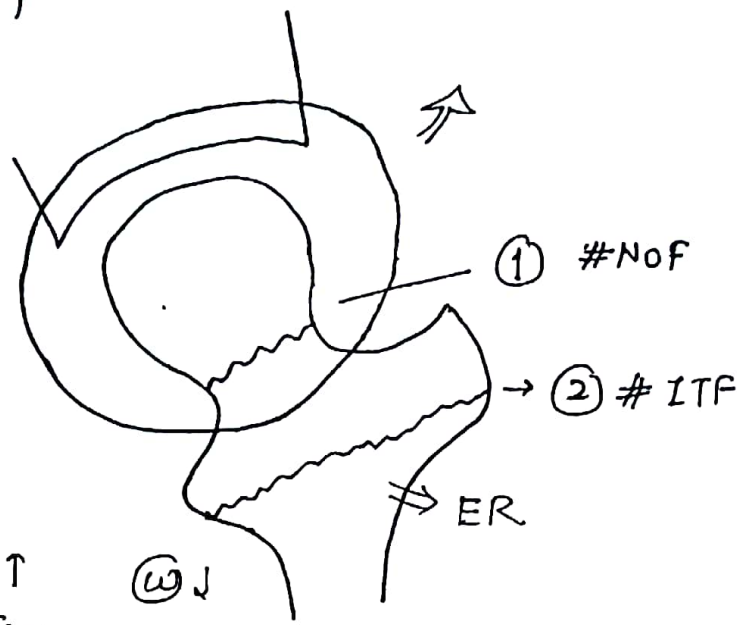
| | Post. H.D. | Ant. H.D. | Central # Dislocation of Hip |
|---|---|---|---|
| | 90% | 7-8% | 1-2% |
| | P.H.D | AHD | CHD |
| Mech. of Injury | Flexion<br>Adduc<sup></sup><br>IR | Flexion<br>Abduc<sup></sup><br>ER | Flexion / Flexion<br>Abd / Adduc<sup></sup><br>ER / IR |
| Clinical Attitude | F Ad. IR | F Ab IR | |
| MC Complication | AVN of Head of Femur | | |
| M/c N/V Injury | Sciatic N/V | Femoral N/V | |

Mx Closed Reduction ↓ Gen. Anaesthesia

Method of CR →

1) Stimsons Gravity Method
2) Kast Baltimore left
3) Modified Allis method (of choice)

## ⓒ # of PROXIMAL FEMUR

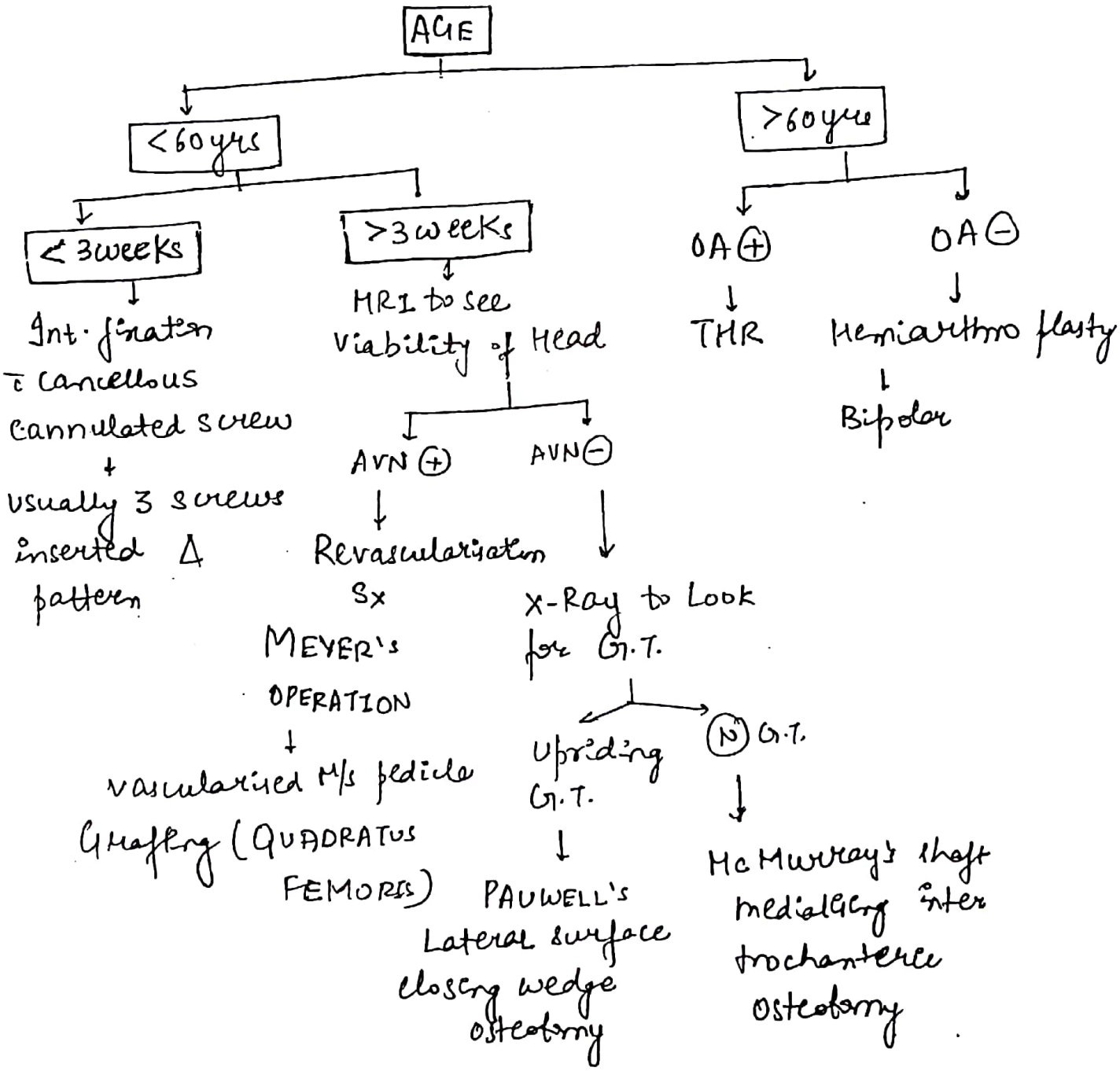



| NOF | | ITF |
|---|---|---|
| Intracapsular | | Extra capsular |
| 5th/6th decade | | 7th/8th decade |
| Trivial Trauma (low energy fall) | | Mod-severe Trauma |
| Mod-severe Pain in Scarpa's Δ | | severe pain, swelling, ecchymosis around G.T. |
| <1 inch | Shortening | >1 inch |
| 0-45° | E.R. Deformity | 45-90° |
| AVN of Head ↓ Non-union. | M/c Complication | Malunion |
| ANATOMICAL PAUWEL's GARDEN's | Classification | EVANS BOYD & GRIFFTHS |

Mx Internal fixation =
DHS / DCS / PFN

- Dynamic Hip screw
- Dynamic condylar screw
- Proximal femoral Nail.

AO PROTOCOL FOR Mx of # NOF (Speed ↓ Unsolved #)



# # Shaft of Femur

Young adults

20 - 30yrs

♂ > ♀

associated :- Severe Trauma

Classification

- Prox 1/3rd
- Middle 1/3rd (M/c)
- Distal 1/3rd (supracondylar # femur)

COMPLICATIONS:-

1) Hypovolemic shock
   Avg Blood Loss = 1-1.5 L or 2-4 units.
2) fat embolism syndrome
3) Infection
4) knee stiffness
5) malunion
6) delayed/ Non-union.

Mx

Age Wise

| < 6 months | 6 mth - 5yrs | 5-10yrs | > 10yrs |
|---|---|---|---|
| PAULIK HARNESS | HIP SPICA CAST / GALLOW's / BRYANT's TRACTION | TEN Titanium Elastic Nailing | Intramedullary Interlocking Nailing |

# FAT EMBOLISM SYNDROME

Young ♂ (20s - 30s)

# SOF - >48-72 hrs

**BERGMANN'S TRIAD**

3C

- **CEREBRAL**
  - Delirium
  - Confusion
  - Convulsions
  - disorientation
  - Stupor
  - Coma
- **CUTANEOUS**
  - petechial
  - Rashes on chest
- **CARDIO PULMONARY**
  - Dyspnoea
  - Tachypnoea
  - Tachycardia
  - cyanosis
  - Hypoxia
  - Hypoxemia

Mx :
1) $O_2$
2) I.V. fluids
3) Forced alkaline diuresis
4) I.V. steroids to counter chemical pneumonitis
5) Pulmonary embolectomy
6) Heparin ( Double edged sword)
   - ↓ Lipase
   - used for limited pts
   - 10μ
   - 2×5μ

## WADDELL'S TRIAD

Femur # + Head Injury + Intrathoracic/ Intra-abdominal Injury

Sequence of Cond" presenting ⊂ shortening :· AIIMs May 2015

P.H.D. > #SOF > Subtrochanteric # > #IIT·F > #NOF

## LIST-21 ANGLES IN ORTHO

Cobb's ∠ :- Scoliosis

K ∠ - Dickson's / kyphosis ∠ = Pott's Spine

Q ∠ - Quadriceps ∠ = Recurrent patellar Dislocation

Pauwel's ∠ - } NOF #
Garden's ∠ -

Baumann's ∠ → Supracondylar # Humerus

Bohler's ∠ } # calcaneum
Lissane's ∠

Meary's ∠ → pes cavus

Kite's ∠ CTEV / clubfoot

## LIST - 22 X-RAY VIEWS

Judet view- # Acetabulum

Zanca view- AC Joint

Stryker Notch view- Hillsachs Lesion

West point Axillary view- Bankart's Lesion

oblique / PA view with in Ulnar deviation
- Scaphoid

Von Rosen view = DDH

Merchant's View = Patellar Subluxation

Mortise view = Ankle AP view in 15° Internal Rotation
↓
Syndesmotic Injury
↓
(Inf. Tibiofibular Jt)

Canale view- # of Talar Neck

Harris · Broden view - # Calcaneum

Serendipity view - Sterno clavicular Jt

Baw Catcher's view - Erosions of in RA

Swimmer's view - Lower cervical spine

## LIST-23 SPLINTS IN ORTHO

Cock up splint → Radial N/V Palsy

Knuckle Bender splint- Ulnar N/V Palsy

Aeroplane splint- Brachial Plexus Palsy

Turn Buckle splint- V.I.C. (Mild) Volkmann's Ischaemic contracture

Coaptation splint – # shaft of ~~femur~~ Humerus

Pavlek Harness } DDH
Von Rosen splint }

Ankle Foot orthoses- Foot Drop

Taylor's Brace- Thoracic Spine

Trauma ← | → Tumour.
TB

## LIST-24 CASTS IN ORTHO

Hand Shake Colle's #

Glass Holding # scaphoid

Cylinder / Tube # Patella

PTB (patellar Tendon Bearing) # shaft of Tibia

Minerva Cx Spine Injury

Risser's Scoliosis

U/ Hanging cast- # Shaft of Humerus

Turn Buckle cast → Scoliosis

LIST- 25

# TRACTIONS

Dunlop - Supracondylar #Humerus

Smith's "

Crutch Field Tongs, Garden well } → Cx spine injury

Gallow's, Bryant's } → #SOF in age < 2yrs

Perkin's - #SOF in adults

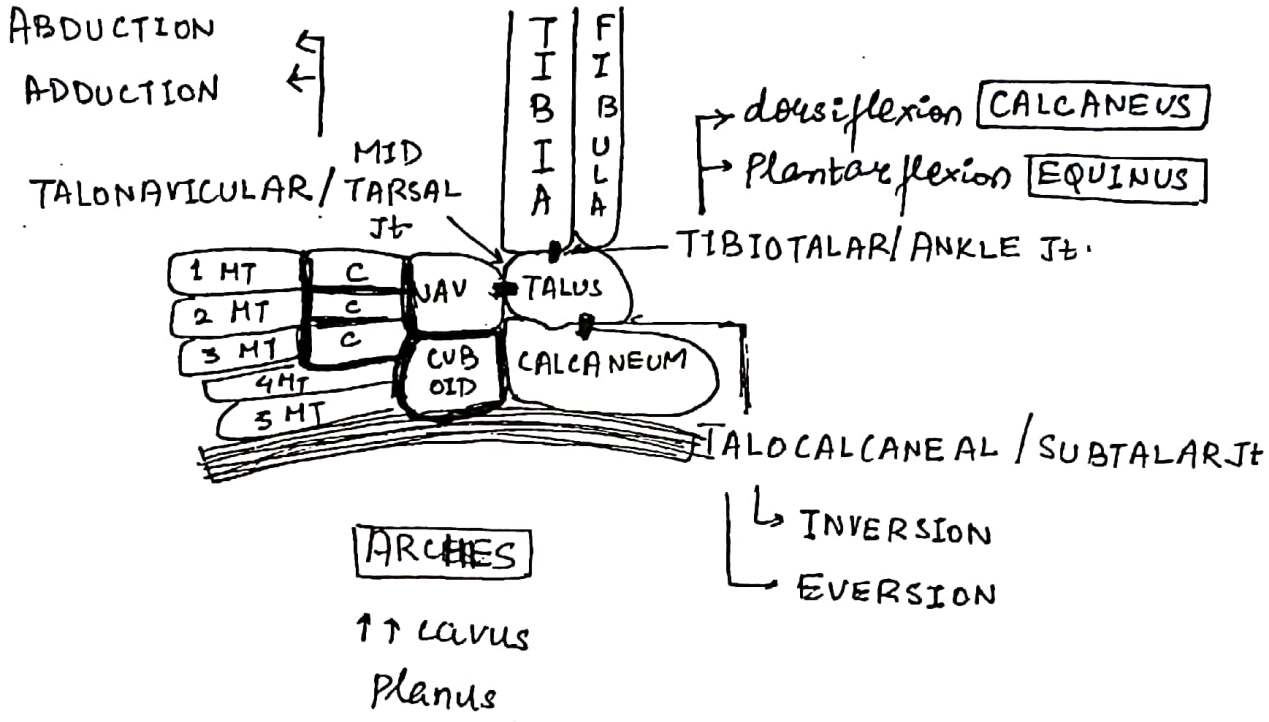
Buck's - Modified skin Traction ✱ for LBP

Agnes, Hunt - Flexion deformity of hip.

# ANATOMY

ADD$^{N}$ + INV$^{N}$ ⟶ VARUS

ABD$^{N}$ + EV$^{N}$ ⟶ VALGUS




ARCHES

↑↑ cavus

Planus

# C.T.E.V. / CLUB FOOT

Def$^n$:- Congenital malformation of Ankle, Leg & foot complex characterised by

varus < Cavus (↑arches of foot)
Adduc$^n$ (@ Talonavicular Jt)
Inversion (Talocalcaneal Jt)
Equinus (Tibiotalar Jt)

## Statistics:-

Incidence - 1/1000

♂:♀ = 2:1

M/C cause = Idiopathic

M/C association = Neural Tube Defect (Spina Bifida occulta S$_1$)

B/L - 50%

Asian: = Western.

(PITX-1).(TBX-4) gene pathway

## PATHOGENESIS

### Theories

Developmental arrest Theory
Myofibroblastic theory
1° germplasm defect theory

Bony Pathology — TALUS — small + hypoplastic

↓

Talonavicular Jt - Subluxation / dislocation

↓

overcontracture

↓

Tendo achilis → Plantare flexion → EQUINUS

Tibialis Posterior → Addn + Inversion → VARUS

CLINICAL SPECTRUM → Dorsiflexion Test (+)

Inability to approximate the dorsum of foot to anteromedial border of leg

X-RAY - KITE'S ANGLE / Talocalcaneal Angle

(N) 30-55°

Δ stk - <25°

Mx (I) At Birth – Infancy (0–1yr)

PONSETTI TECHNIQUE

Dr. IGNACIO PONSETI → Date of Birth
3rd June
Club foot day

MANIPULATION & CASTING

By Doctor
Not by mother
Reversal of deformity
Started as soon as possible after birth

By Doctor
1st Cast
L Lanugo / umbilical stump shedi off
5–7 Casts
Serial weekly Basis

FULCRUM – Head of Talus

AIM – Talonavicular Jt. Reduction

SEQUENCE:-
CAVUS → VARUS → EQUINUS

PONSETI's TECHNIQUE

(+) Immobilisation
- DAY
  - CTEV shoes
  - No heel → Equinus
  - Straight Inner Border → Addu
  - Outer shoe Raise → Inversion
- NIGHT
  - Denni Brown Abduc" Splint

(-) (II) Age 1–5yrs
PMSTR
Posteromedial Soft tissue Release
TURCO's operation
McKay's Release

(+)

(-)

(−)

↓

(III) Age > 3years

Bony Surgeries

Lateral column shortening Procedures

Dwyer's Osteotomy

Dillwyn Evans Sx

Lichtblau's Sx

(+) ← → (−)

(IV) Age > 10yrs

TRIPLE ARTHRODESIS

Surgical fusion of three joints.

Talonavicular Jt

Talocalcaneal Jt.

~~Talo~~ Calcaneocuboid Jt

M/C Comp$^{n}$ :- Talonavicular Jt pseudoarthrosis

# LIST - 26 # 's INJURIES & EPONYMS

1) ODONOGHUE'S UNHAPPY TRIAD

Injury to ← A.C.L
MCL
MM

2) JUMPER's #

(H) shaped sacral # due to fall from height

3) JUMPER's KNEE

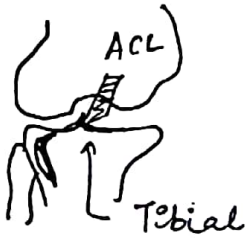
Tendinitis of patellar Lig (Lig Patellae)

4) SINDING LARSEN JOHANSSON SYNDROME

Partial rupture/avulsion of patellar Tendon from lower pole of patella — Traction Tendinitis in lig. patellae

5) BUMPER's #

# Lateral condyle of Tibia




6) SEGOND's #

# Tibial condyle extending into Tibial spine → ACL tear

7) TODDLER's # / CAST # ★

Children
fall from height
Spiral #
Tebia

8) AVIATOR's #

# Neck of Talus

TALUS

1) Retrograde blood flow
2) Max. wt bearing bone of Body ( $Kg/cm^2$ )
3) NO m/s attachments
4) SQUATTING FACETS ★

## # NECK of Talus

AVN appears in 4-6 wk → disappears

M/C Comp$^n$ - Subtalar arthritis

Body of Talus

HAWKIN's SIGN

Good X-Ray sign = Revascularisation

9) LOVER's # / DONJUAN's #

Intra articular # of calcaneum due to fall from height

Usually B/L

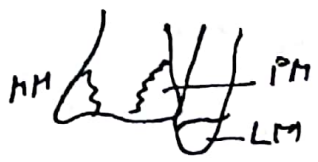
M/c complication = Malunion

X-RAY → Bohler's ∠ Ⓝ · 20-40° ↓

Crucial angle of Gissane Ⓝ 100 - 145° ↑

10) POTT's #

Medial & Lateral malleolus #




11) COTTON's #

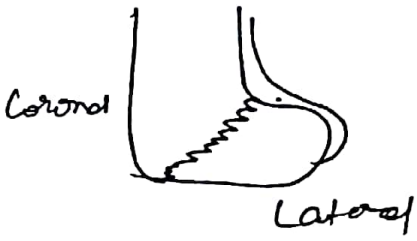
Medial Malleolus + LM + PM

12) PILON's #

Intraarticular # of distal tibial plafond (distal tibial articular surface) ± metaphyseal comminution

13) HOFFA's

Coronal plane # of one or (B) femoral condyles




14) NUTCRACKER's #

Intraarticular # of cuboid

15) LISFRANC's # DISLOCATION (T.M.T.)

Tarsometatarsal Jt. # Dislocation

16) CHOPART's # DISLOCATION (I.T.)

IntraTarsal Jt. # dislocation.

17) RUNNER's #

Spiral # of distal Fibula (hairline)

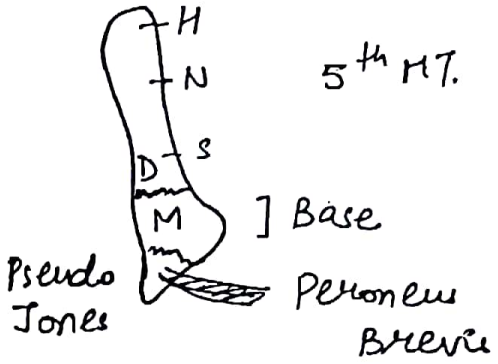
18) JONES #

# of 5th Metatarsal @ metaphyseodiaphyseal Jn.

JMD - Jone Mete

19) PSEUDO JONES #/ DANCER'S #/ TENNIS #

# of 5th Metatarsal @ tuberosity / tip of due to violent pull of Peroneus Brevis




TENNIS ELBOW

Lateral Epicondylitis

M/C ⇒ E.C.R.B.

Extensor Carpi Radialis Brevis

GOLFER'S ELBOW = Medial Epicondylitis.

In Golfer Tennis Elbow > Golfers Elbow

TENNIS LEG → Rupture of medial Head of Gastrocnemius

20) STRADDLE #

B/L Sup- & Inf ~~pubi~~ pubic rami #

21) DUVERNEY'S #

Crescent Shaped Iliac Wing #

22) MARCH # Shaft

Stress # of 2nd Metatarsal